The Mining Journal

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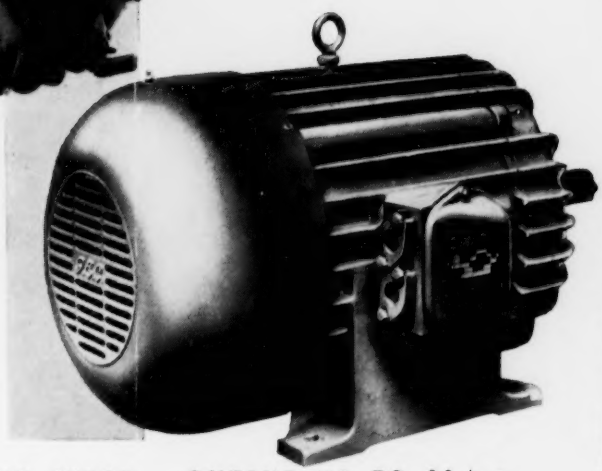

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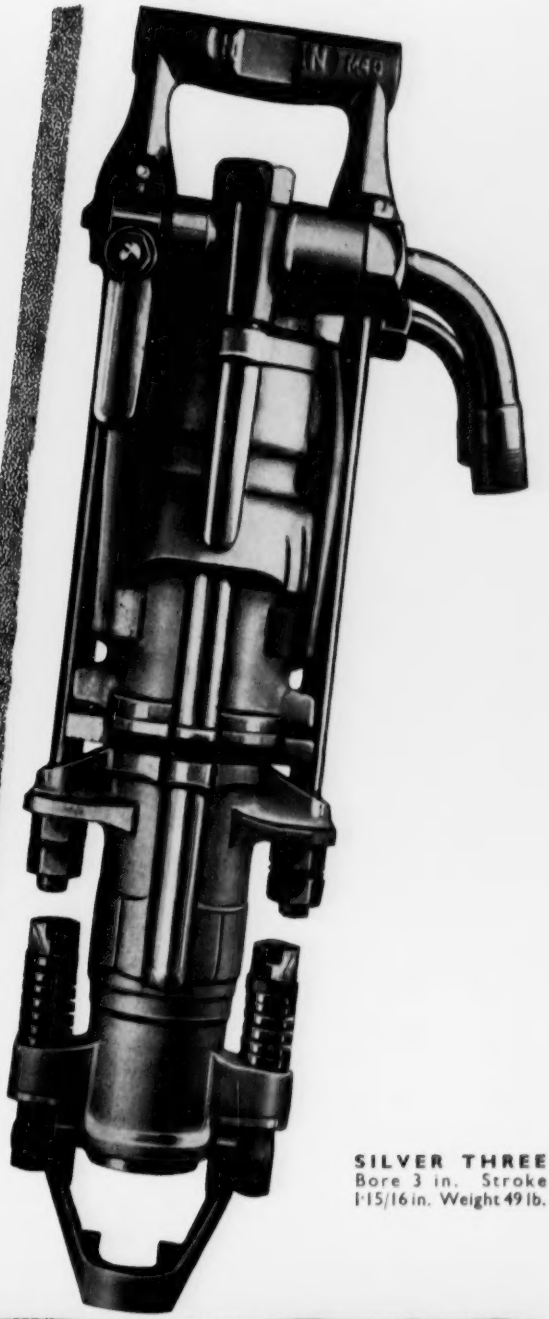

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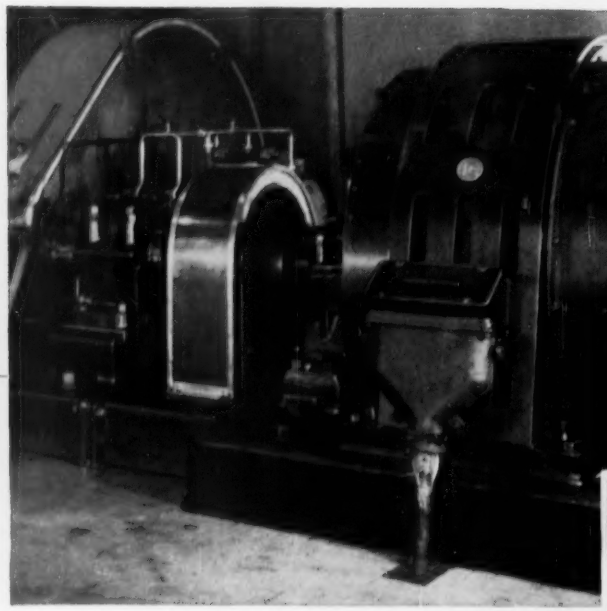

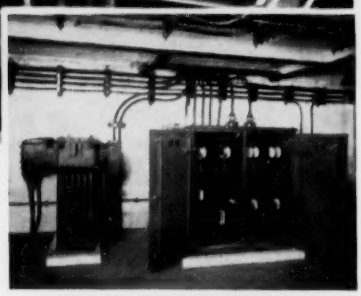

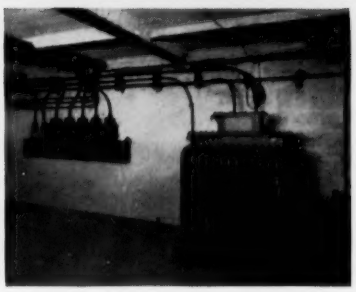

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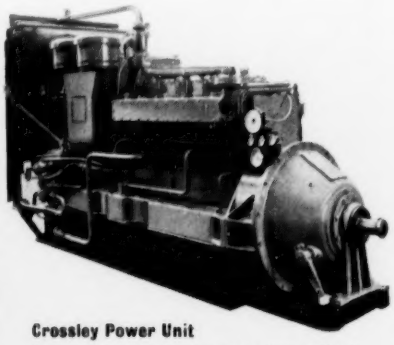

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The Mining Journal

Established 1835

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NOTES AND COMMENTS

Royal Commission Re-Assess U.K. Tax Codes

The Royal Commission on the Taxation of Profits and Income published its Final Report earlier this week nearly four-and-a-half years after its appointment. The Commission began its labours under Lord Cohen and completed its task under Lord Radcliffe.

In the Final Report covering almost 500 pages ninety recommendations have been made. No revolutionary principles have been enunciated and none were expected. However, in the dissenting report signed by three members—Mr. Nicholas Kaldor and two trade unionists—the radical ideas of using expenditure rather than income as a basis for assessment was raised. Generally speaking the proposals in their entirety were directed towards bringing about a greater sense of proportion and efficiency to the existing tax codes, and the verdict must be that the existing British taxation system, very largely at any rate, is equitable and just.

Among the principal recommendations were a flat rate of profits tax; assessment on a current year basis; the rejection of a capital gains tax; and special treatment for companies trading overseas.

The mining industry will, perhaps, take more heart than substance from the recommendations. In particular the recognition of depletion allowances and the special recognition of a category of companies to be known as "overseas trade corporations" will be warmly welcomed. Nor will it be forgotten that much of the credit for the acceptance of these two points belongs to the British Overseas Mining Association.

The Commission recommended that a depletion allowance should be granted for the cost of acquiring, after an appointed day, mineral rights or areas in the United Kingdom. In consequence, the existing depletion allowances for overseas minerals should be brought into line by the removal of the present limitation by reference to the cost to the first U.K. purchaser.

With regard to overseas profits, it is suggested that a special category of overseas trading concerns to be known as "overseas trade corporations" be exempted from tax on undistributed profits. This could be extremely important as it will confer upon U.K. registered mining companies the benefits which accrue by change of domicile without the transfer of management and control. Indeed, its implementation would end the queue at the Treasury door to emigrate to more equable tax claimes than that obtaining currently in the United Kingdom.

The Kariba Report

It will be recalled that in our issue of March 4, 1955, it was reported that the decision had been taken to proceed with the Kariba Gorge hydro-electric power scheme in the Federation of Rhodesia and Nyasaland, rather than the Kafue scheme. This decision was the outcome of extensive appraisals by the French hydro-electric power expert M. Andre Coyne, who reported that Kariba Gorge had been proved entirely satisfactory from the point of view of hydrology. The rival Kafue scheme was possessed of too indefinite a potential output capacity to satisfy possible lenders of capital. This information was added to by a letter from our Rhodesian correspondent, who reported in our issue of June 3, 1955, that if "certain conditions" were satisfied the first power will be supplied by the Kariba scheme in 1960.

This assumption was the highlight of the report on Kariba released to the Federal Prime Minister by M. Coyne and M. Jacques Tisne. The report went on to state that Site X for the dam on the Zambesi River is excellent and can be adopted without further study. Preparation of calls for tenders may be undertaken immediately on a firm basis, and preliminary work started without delay. Housing construction should begin at once and the total labour force should be on hand for the chief contractors by the end of 1956 or early in 1957.

Mr. Coyne and M. Tisne, who visited the Federation during March and April this year, say that the Kariba scheme is technically sound. Once the river is caught in the trap set for it—a crucial operation, which must be carried out succcessfully in 1957—the rest is merely a matter of routine. The final result is then a foregone conclusion without any possibility of error. The unanimity of the opinon expressed by successive experts who had examined the problem each in their turn is the best proof of this. Enough is now known

of the river and the sites for starting immediately. M. Coyne and M. Tisne endorse the proposal for constructing a footbridge between the two banks of the Zambesi, and suggest that a contractor be contacted who could begin work in July or August this year on the river bank coffer dams and the diversion tunnel.

The consultants further state that the study of the access routes is also nearly completed and that they have been informed that the railway line extensions should be completed by the end of 1956. The present track will be improved immediately so as to enable a five-ton vehicle to pass along it during the dry season and a three-ton vehicle during the rainy season. With regard to the new road, the track is easy over a great distance and it would not appear impossible to finish building it between now and the end of 1956, with the possible exception of making some temporary sections in areas which will be flooded later, so as to allow more time for building the sections in more hilly areas.

Commenting on the danger of earthquakes, the report says that to the knowledge of M. Coyne and M. Tisne, no arch-dam has ever been destroyed by an earthquake, although many have been built in Japan and California. So far as silting-up is concerned it would take thousands of years to imperil a reservoir of the size of Kariba. During a ground inspection of Site X, with Sir Malcolm Barrow, Federal Minister of Power, the consultants were convinced that the site had been sufficiently explored to be adopted immediately.

One fortunate aspect of the decision made for giving up the down-stream sites is that the Kariba Gorge itself will be preserved from submersion. It would be more difficult to divert the river at other sites than at Site X, and consequently slower and more costly.

In concluding their report the French experts pay tribute to the Southern Rhodesia Irrigation Department for the promptitude with which the surveys of Site X were carried out. Valuable time was thus gained, which will be of immense help to the scheme.

Ten Years of "Rudnap"

In May the Yugoslav enterprise Rudarsko Nabavno Prodajno Preduzece celebrated its decade of existence. It is therefore timely that information on Rudnap has lately been received from a correspondent in Yugoslavia.

Rudarsko Nabavni Zavod was founded in 1945 by the government of the FNPR of Yugoslavia, and subsequently developed into Rudarsko Nabavno Prodajno Preduzece, formed for the task of supplying Yugloslav mining and metallurgical enterprises with equipment and plants as well as with raw materials. Until the break in diplomatic and economic relations between Yugoslavia and the Eastern European *bloc* in 1948, Rudnap imported such items as electrical motors, machinery and plants of all types, mining equipment, coke, fireproof materials, chemicals, and rolled and drawn products. Up to that time the main source of supply was Eastern Europe, although a lesser amount was derived from other countries. Simultaneously, UNRA aid for the Yugoslav mining industry was distributed through Rudnap.

Yet Rudnap has not only engaged in import activities. From its inception the group actively exported Yugoslav products, and under its auspices the first output of the smelter industries to leave Yugoslavia since the war were sent to the markets of the world. These products included such items as iron ores, pyrite, magnesium, refined lead, zinc, copper and quicksilver. Since the break with the Eastern European powers until the present, Rudnap has dealt with the Western European countries and the United States.

Rudnap played a key role during this period of Yugoslav development, by importing machinery and plant—on occasions the complete equipment necessary for a particular project—thus aiding the development of the mechanization of the Yugoslav mining and metallurgical industries and increasing the national production quota. More specifically, in this period of expansion and modernization, Rudnap imported more than 50 large and medium-sized excavators, 20 complete aerial ropeways, and thousands of other equipments such as electric motors, conveyors, earth moving units and the like. In addition, the group imported the complete equipments for the Boris Kidric coke plant, the Kolubara drying plant, the separation plants at Kreka, Kakanj, Banovici, the power installation at Kosove, the flotation mills at Suplja Stena, Zajaca and Nove Brdo, as well as the complete equipment for the mechanization of the bauxite mines.

The mechanization of the coal mines was carried out with machinery imported by means of a loan of $12,000,000 from the International Bank. This mechanization programme has already increased the national coal output.

Yet Rudnap has not concentrated its activities on the mining and metallurgical industries alone, for by the decentralization of Yugoslav economy the group has extended its interests to other branches of industry, notably construction and electricity. As Yugoslavia's economic relations with other countries are more widely developed, the activities of Rudnap will be extended in parallel.

Brazil

(From Our Own Correspondent)

Teresopolis, May 20.

The increased activities of the Department of Mineral Production (DNPM) this year have revealed several new interesting deposits. Occurrences of hubernite and thorium have been proved in the Ceara Municipality of Ico, while in Bahia, on the Alto Bonito estate, calcite has been discovered and is being exploited by the owner. The existence of bauxite, with over 60 per cent aluminium, in the Oiapoque Municipality, Amapa Territory, was confirmed in April. Another valuable deposit of fluorspar has been discovered in Bahia, at Bom Jesus da Lapa, and will be opened up to supply Brazil's steel plants, replacing that hitherto imported from France and Argentina.

NICKEL OUTPUT BY SMALL PRODUCERS

The DNPM, pursuing its policy to foment local processing of minerals which are relatively scarce in other countries, is assisting small mining companies to treat silicated nickel ores. These, the most abundant in Brazil, are being dealt with by the electro-metallurgical process at Liberdade, an important mine in Minas Geraes. Local sources of hydraulic power will produce 4,000 kWs at low cost.

Several new occurrences of two per cent nickel have recently been discovered in the neighbourhood of the Liberdade mine. The latter is producing 1.5 tons of ferro-nickel daily, with a 20 per cent nickel content. According to the U.S. Department of Mines Brazil has seven garnierite districts, namely five in Minas Geraes and one each in Goias and Rio de Janeiro.

The DNPM announces that the Sao Joao del Rei cassiterite deposits have a 70 per cent tin content. The mineral is associated with spodumene, lepidolite, beryllium and titanite, which increase the economic value of the deposit. The electrostatic separator, ordered in Germany,

will enable Sao Joao del Rei to meet Brazil's present needs of pure tin.

Two new licenses have been issued to prospect lead deposits, namely at Macaubas, Bahia, and Cerro Azul, Parana. The galena deposits of Parana are next in importance to those of Ribeira do Iguape, in Sao Paulo. They have a high silver content and are frequently associated with zinc blende. One of the occurrences, that of Panelas, has known reserves of 300,000 tons of galena with approximately 150 tons of recoverable silver. Other deposits are known to exist in Para, Paraiba, Bahia, Minas Geraes, Rio Grande do Sul, Mato Grosso and Santa Catarina. Of the recent discoveries only the Blumenau deposit of Santa Catarina is being worked.

Western United States

(From Our Own Correspondent)

Portland, Oregon, May 25.

The NLRB-Union situation appears to be stalemated for the present. The Board was prepared to move aggressively against any unions that appeared to be Communist-dominated but has been balked by adverse court decisions, the last being by the U.S. Supreme Court reversing convictions for contempt-of-Congress of three union officials who refused to testify as to Communist affiliation. It is hoped that legislation that has been prepared in Congress will give NLRB greater jurisdiction in such cases.

UNION HOUSE-CLEANING

Analysis of some recent figures indicates that for some years past the Communist-dominated unions have been rather consistent losers in elections to determine representation when they have been opposed by " right wing " unions and that Mine-Mill has fared even worse than the average. Thus the unions appear to have been more successful in cleaning their house than has the Government. The merger agreement now being negotiated between AFL and CIO definitely bans accepting into the merged organization any union that has been expelled from the two founding unions and threatens expulsion of any member union that might accept an expelled union as an affiliate.

The Silver Purchase Act is again under fire and, as in the past, Senator Green of Rhode Island is leading the attack. Senator Green's constituents include some large silverware producers and obviously a lower price for the metal would be to their advantage but, on the other hand, Western senators and congressmen will resist the measure vigorously as almost all of the silver produced is as a by-product of the base metals and producers of lead and zinc especially aver that the mines will not be able to maintain production, even with the stockpiling programme to aid them, without a fair price for silver.

COPPER DEVELOPMENT

In so far as the copper industry is concerned, Anaconda is still exploring in the vicinity of Butte in the locale that has been worked so extensively in the past. Most recent development is that a churn drilling programme has demonstrated a deposit at shallow depth, amenable to surface operation, in proximity to the Greater Butte Product which is mining ground considered years ago to have been worked out. The newly discovered deposit is estimated to contain 100,000,000 tons of ore of low grade. Drilling will continue for further delimitation of the orebody and stripping will start soon.

Meanwhile an extension of the Kelley ore zone of the Greater Butte Deposit has been developed as an open pit and is now producing at the rate of 2,000 tons per day. At the Deep Ruth development at Ely, Nevada (*The Mining Journal*, April 29, 1955) sinking of the Deep Ruth and Kellinskie shafts has been completed and the connecting crosscut has been holed through. Next step will be to develop the ground between the shafts for block caving and while this is going on attention will be given to mining the " Minnesota-Hi," the newly discovered orebody in this area which is of sufficiently better grade than run-of-mine to be accorded special treatment.

BASE AND ALLOY METALS

American Smelting and Refining Co. and Resurrection Mining Co. (Newmont) are inaugurating a joint exploration and development programme in the Leadville, Colorado district. A.S. and R. controls a large acreage and had opened it by its Irene No. 2 shaft to the 1,750 ft. level but discontinued work a year and a half ago on account of market conditions of lead and zinc. Resurrection owns ground adjoining A.S. and R. and controls the Yak tunnel which affords drainage to a considerable portion of the district. The new programme involves connecting the shaft and tunnel, which will simplify pumping at the shaft, and permit opening up an extensive area on the two properties. International Smelting and Refining Co. (Anaconda) has started its lead smelter at Tooele, Utah, which has been closed for the past year.

Climax Molybdenum Co. has completed expansion of its mill at Climax, Colorado, which will enable it to enlarge its output by more than 5,000,000 lb. annually, an increase of approximately 10 per cent. Tungsten is an important by-product of the molybdenum operation. Climax Uranium (subsidiary) is enlarging its uranium mill at Grand Junction

The Government manganese ore buying depot at Wenden, Arizona, shut down April 30 on completion of the purchase quota that was set up when the depot was established. It was the outlet for about 50 mines which employed 1,000 workers.

Mountain Copper Co., for years one of the mainstays of the Shasta Copper Belt of California, is converting its Iron Mountain mine to an open pit operation.

THE URANIUM PROGRAMME

Denver and Rio Grande Railroad and Baldwin-Lima-Hamilton Corporation, manufacturers of locomotives, have been authorized by AEC to make a study for an atomic powered locomotive. The companies will finance the programme and will be assisted by AEC in carrying out the research. AEC has signed a contract for a mill at Edgemont, South Dakota, which will afford treatment facilities for the Black Hills and Wyoming areas and construction is under way for an expansion of U.S. Vanadium's plant at Uravan, Colorado.

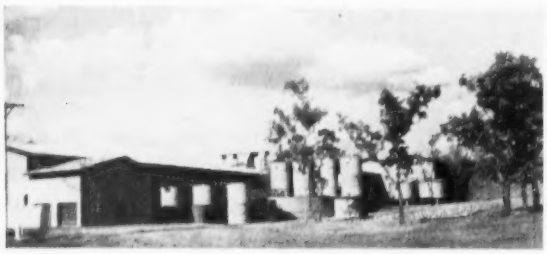
Homestaking Mining Co., which was a pioneer in the Black Hills uranium development and has been active in the Colorado Plateau has now entered the Gas Hills district in Wyoming Another district in California has started production with a small shipment from a new discovery at the west end of the Mohave Desert. The ore averaged 0.43 per cent U_3O_8 which should yield $68 per ton at the receiving depot, plus an allowance for haulage.

Newmont Mining Corporation has made an agreement with Midnight Mines, Incorporated, owners of the uranium deposit recenty discovered on the Spokane Indian Reservation in northwestern Washington, by which Newmont agrees to develop the property through a company to be organized for that purpose.

The State of the Australian Mining Industry

It is now apparent that the search for uranium in Australia will be dogged by heavy expenditure as comparatively few occurrences so far discovered can be classed as commercially important. In addition, the gold mining industry in the Commonwealth is passing through a difficult period, despite the fact that production during 1954 was the highest for twelve years. The difficulties faced by the Australian mining industry may be laid partially at the door of excessive labour costs, together with the fact that it is proving increasingly difficult to attract young graduates who could form the basis of a highly trained technical nucleus in the years to come. These points are elaborated in the following article, received this week from our Australian correspondent.

Mine production of gold in Australia in 1954 was the highest for 12 years. The total recorded was 1,116,000 f.oz., an increase of 40,952 f.oz. on the production for 1953. The largest contributor was Western Australia with 77.2 per cent of the output, followed by Queensland, 8.7 per cent, Northern Territory, 4.8 per cent, Victoria, 4.7 per cent and other States, 4.6 per cent. The value of the production was



The treatment plant at the Rum Jungle uranium project

less than in 1953, although the recorded ounces were higher, because of the decrease in premium sales of gold overseas. This factor will influence the value of sales in the current year, although the raising of the official price by the Commonwealth Government from £A15 9s. 10d. to £A15 12s. 6d. per oz., as from May 1, 1954, will be of some small assistance. Any help from this source will be more than discounted by the increase in wages resulting from the granting of claims for higher margins for skill in the various classifications in the industry. With a fixed price for gold, such increases can be countered only by a longer working week and greater production.

RISING COSTS

Australian industry is now facing the impact of the 40 hour week and steepening costs of labour and all stores and raw materials. The effect of the 40 hour week in the mining industry may be gauged from the realization that of the 40 hours paid for, actual productive hours worked are between 23 and 25 per week. Added to this are the payments for idle time, that is, provision for paid annual leave for employees, payment for statutory public holidays, and sick leave. The provisions vary from State to State, annual leave may vary from two to three weeks, statutory holidays are as many as 10 in one State, and the general provision for sick leave is one week. In one State, these concessions, paid for and quite non-productive, amount to six weeks, of 40 hours, per year.

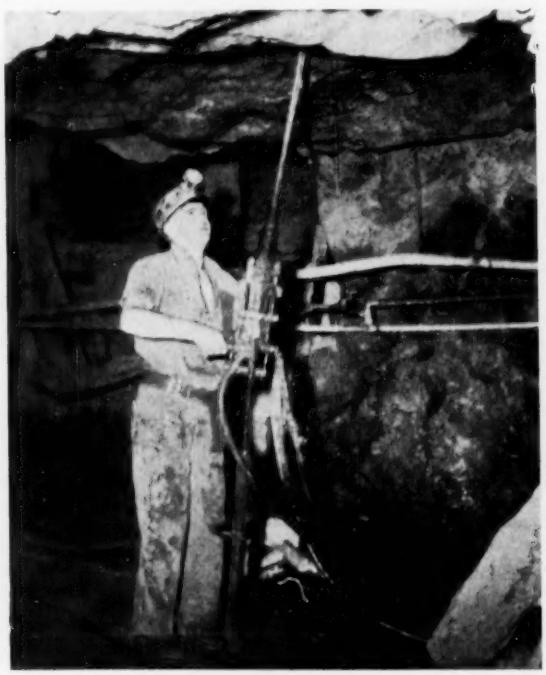
A healthy sign is the recognition by the State Arbitration Court of Western Australia, in considering union claims for marginal increases, which stated that "the gold mining industry is in a less prosperous state than it was in 1934 and warrants a substantial reduction in the industry allowance." In that year, an industry allowance was first granted to mine workers. The industry allowance has now been reduced by 5s. to £A1 15s. per week. At the same time the Court considered that some alteration should be made in the method of calculation, that any formula based on the price of gold, which was controlled overseas, and took no account of Australian costs, should be discarded.

A matter of increasing concern to the mining and metallurgical industry, and to the engineering profession, is the very small number of students entering the universities and technical colleges to take up mining and metallurgical courses. The intake is far less than the loss through age retirements, and defections to other branches of engineering.

SHORTAGE OF SUITABLE RECRUITS

It is becoming increasingly difficult to maintain technical staffs to the requisite numbers and harder still to obtain sufficient men with the desired qualifications for particular work, whereas the demand for such men is steadily increasing. Teaching facilities have expanded greatly, but the profession seems to have lost its appeal. This may be due to some extent to the attractions of city life and its amenities which give a strong urge towards the secondary metallurgical industries located in cities and large towns, as against the relatively remote, though by no means less comfortable or attractive life of the mining towns, or the isolated mines, where modern amenities are of a high order.

The matter of money is an important factor, and many young men take the view that as good, or even higher, salaries can be obtained in other callings, without the need for years of study, or the assumption of responsibility. There is, too, a lack of understanding by modern youth and modern parents, of what the mining and metallurgical profession and industry of these days really means; the profession does not dress its shop window, and the industry receives no publicity of a desirable nature.



Drilling a vertical hole with short pusher leg attachment at Gold Mines of Kalgoorlie, Western Australia

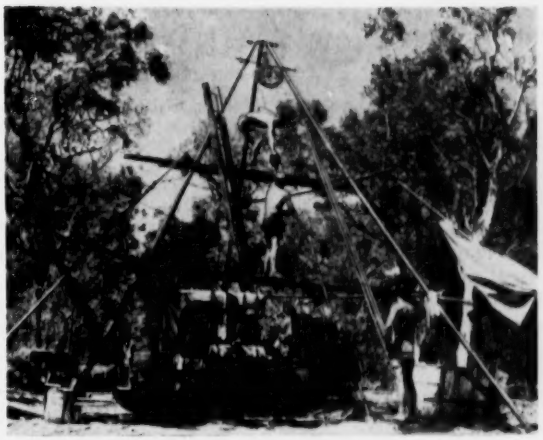
The matter is serious and calls for concerted and well directed effort. The problem is being attacked by the Australasian Institute of Mining and Metallurgy, through a permanent committee which is preparing a realistic approach which, it is hoped, will bring the desired results. Amongst the rank and file, industrial awards and regulations are having an adverse effect. For example, miners on ore or coal can earn much more than is paid to shift bosses, or deputies in collieries, so that these positions now offer little attraction, instead of being goals, such as they once were; consequently the ranks of these officials are being steadily depleted by advancing age, and it is not possible, under award conditions, to retain men in such positions after they have reached the prescribed age for retirement. The position, with regard to both technical and non-technical men for positions of more or less authority and responsibility, is steadily deteriorating to a danger line for the industry.

URANIUM DEVELOPMENT

A recent statement in the Federal Parliament by the Ministry of Supply referred to the important results which have followed the Government's policy of interesting private enterprise in the exploration of the country's uranium possibilities. This policy has been followed in all States but South Australia; in that State uranium mining is a State Government preserve, and as a consequence, there is no inducement to private effort in prospecting. Under private effort, work in Queensland, Northern Territory and Western Australia is very active. The Minister emphasized what the speculating public failed to realize in the early boom months, that the price for uranium is not fabulous, and that large profits did not lie ahead of the investor.

It is now very apparent that heavy expenditure faces the search for uranium and that the commercially important occurrences are few. A factor set on one side in the boom months was the cost of treatment plants, that their high cost necessarily limited very drastically the number of plants that could be erected and, consequently, the number of ore-buying centres. Also discounted was the time to be spent in the development of ore reserves adequate to warrant the construction of a costly treatment plant, the long distances that ore must be transported to a plant when established, and the time that must be spent in test work before a treatment process has been finalized and construction can proceed.

Use of flexible drill steel at Great Boulder Pty. Gold Mines, Western Australia



Diamond drilling at Rum Jungle

METHODS OF TREATMENT

It is notable that in the three commercial uranium centres so far proved, or potential, a different method of treatment is required. There is a general similarity in the ores of the Northern Territory and a method of treatment suitable to them has been established at Rum Jungle, where the plant must serve a very wide area; a different treatment applies to Radium Hill, in South Australia, where the ores are, again, of a distinct type; and the Mount Isa-Cloncurry ores present their own particular problem which is being investigated while drilling is proceeding on the two large uranium occurrences to determine whether tonnage and grade warrant plant construction. Many of the occurrences prospected in Australia have already proved to be of no commercial importance and the number that will reach that standard will be small, despite publicity given to "great uranium potential."

There has been agitation for buying centres, but if Australia follows the lead of the United States in buying oxide rather than ore, this will prove another complication for the small producer. As stated by the Minister for Supply, "merely to buy uranium ores of commercial grades wherever they may be found in Australia could well involve the outlay of many millions of pounds of public money with the definite risk that, for many years, there would be little or no return."

THE SOLOMON ISLANDS

Interest has been aroused in the Solomon Islands by the reported discovery of auriferous lodes, which are thought to have contributed the alluvial gold which has been found from time to time in some of the rivers. Immediately prior to the war Fijian interests were engaged in prospecting in the Solomons and it is understood that there was some encouragement to continuation of the work, but little seems to have been done since.

A Government geological party has made the recent discovery. An area has been granted under prospecting licence to a syndicate, which was the pre-war holder of the ground, and which was prospecting at that time. Diamond drilling has been recommended.

Aluminium's First Century

A hundred years have elapsed since the first particles of aluminium made in Britain were displayed by Michael Faraday at the Royal Institution. This notable centenary was fittingly celebrated by an Exhibition arranged by the Aluminium Development Association, held at the Royal Festival Hall, London, from June 1 to 10. Its purpose was to show the world some of the many ways in which aluminium is used and the part played by British industry in its development. The development of aluminium, together with the more interesting of the displays at the Exhibition, are described in the following article.

Early in the nineteenth century a great British scientist, Sir Humphrey Davy, first postulated the existence of the metal aluminium in the oxide, alumina. Aluminium remained a purely thoretical metal, however, until 1825, when the Danish chemist, Oersted, succeeded in isolating a few particles by reducing aluminium chloride with potassium amalgam. A few years later Wohler produced a button composed of rather larger particles and determined some of the properties of the metal, which were published in 1854. During the same decade Bunsen attempted the production of aluminium by electrolysis.

The welding of aluminium

It was a French chemist, Deville, who developed the first commercially successful reduction process. He succeeded in interesting the Emperor, Napoleon III, in the possible use of aluminium for implements of war and received funds for conducting experiments to improve the production of sodium, which he then used instead of potassium to reduce aluminium chloride. The results of his work on aluminium were published in papers to the French Academy of Science in 1854. In the following year a dozen bars of aluminium were shown publicly for the first time at the Universal Exposition in Paris. Interest in Britain was immediate and a specimen of the metal was exhibited by Faraday at the Royal Institution on March 30, 1855.

The Deville process was introduced into England by F. W. Gerhard, who started operations at a small works in Battersea in 1859. Reasonably large quantities were subsequently produced by the Aluminium Crown Metal Co. of Birmingham from about 1877 to 1891 and were sold at prices ranging from £5 a lb. initially to 16s. towards the end of this period. Johnson, Matthey and Co. became selling agents in England for Deville's aluminium, which was handled on the basis of a precious metal.

ELECTROLYTIC REDUCTION PROCESS

A new chapter in the history of aluminium began in 1886 with the discovery of the electrolytic reduction process, which remains the basis of the extraction methods used to-day. Paul Héroult in France and Charles Martin Hall in America made the discovery within a few months of each other. The first works to produce aluminium by the new process commenced operations in 1887 at Neuhausen in Switzerland. Electrolytic production of aluminium commenced in Britain in 1890 on a commercial, but pilot-plant scale at Patricroft near Manchester, using the Hall process. The company responsible was associated with Johnson Matthey and was known as the Metal Reduction Syndicate.

The British Aluminium Co. was formed in 1894 to work the Bayer process for the production of alumina from bauxite and the Héroult patents for electrolytic reduction. The company had the services of Lord Kelvin as adviser and Sir William Murray Morrison was associated with it until his death in 1948.

The effect of the new electrolytic process on the price of aluminium was spectacular. World production in 1886 was less than 40 tons per annum, but ten years later some 2,000 tons was being produced and the price had fallen to about 1s. 7½d. per lb. World production of the metal now approaches 3,000,000 tons a year. British industry contributes 30,000 tons to the total of virgin aluminium, but fabricates nearly 300,000 tons per annum into semi-finished products. In 1947 the price of aluminium metal was about 8d. per lb., but increases gradually brought it to slightly under 1s. 6d. per lb. by June, 1955.

The Centenary Exhibition presented a broad historical picture of the development of aluminium and aluminium alloys. Its dominant theme, however, was that aluminium has become the most common metal in daily use, with the sole exceptions of iron and steel. An impressive indication was given of the growth of aluminium application in twelve specific fields : aircraft, road transport, packaging, marine, railways, building, consumer goods, structural engineering, chemical engineering, electrical engineering, general engineering, and agriculture and food processing.

MINING EQUIPMENT

While no section was specifically devoted to mining, several examples of mining equipment were on view. The use of aluminium castings for a portable ventilating fan, where lightness and durability are essential, was demonstrated by a compressed-air driven 16 in. mining fan weighing only 60 lb., which was a product of Keith Blackman Ltd. An electrical mining drill by Hardypick Ltd., weighing 40 lb., showed how the use of aluminium can result in a valuable saving of weight in difficult conditions underground.

Aluminium bodies for commercial road transport have been found ideal for heavy, arduous work because of their light weight, resilience, freedom from wear by abrasion, and the phenomenally long service they give. A National Coal Board tipper of 11 cu. ft. capacity with an aluminium body by Bonallack and Son Ltd. was on view. Though of extremely robust construction the body weighs only 10¼ cwt. The complete vehicle weighs under three tons. Vehicles of this type are operating in mountainous country under severe

conditions, including loading with unbroken coal in lumps weighing up to about four cwt. from a cliff face top, giving a drop of 14 ft. on to the floor of the body. Experience has shown that the additional cost of an aluminium body, as compared with steel, is soon recovered by the greater payload carried.

Another notable exhibit was a 170 ft. jib for a walking dragline machine, which was constructed by Head Wrightson Aluminium Ltd. for Sir Robert McAlpine and Sons Ltd. It weighs about 11 tons and is designed for a minimum working angle of 25 deg. with a bucket capacity of five cu. yd. The use of aluminium enables a longer jib length to be achieved than would be possible with heavier materials.

A micro-optic alidade and micro-optic theodolite, manufactured by Hilger and Watts Ltd., were fine examples of the use of both wrought and cast aluminium alloys in instrument construction, resulting in lightweight instruments.

The aluminium industry continues to look ahead. Fundamental research goes on continuously in laboratories created by the industry and in collaboration with universities and colleges of technology. Some results of recent research were represented by examples of new products including hot dip aluminized steel, aluminium-tin bearings, hard anodic coatings, and integrally stiffened sheet.

As the industry enters its second century, fresh programmes of expansion and application are being planned. New plants are envisaged in Central and West Africa, Brazil, British Columbia, Surinam, Yugoslavia and elsewhere. The Paley report estimates that production will reach 6,000,000 tons by 1975.

It is anticipated that in the first instance the additional aluminium will be required by those industries that are at present large consumers and that are themselves expanding. Looking further ahead, however, spectacular openings are foreseen for aluminium in the new industries which will be born as the era of atomic energy unfolds.

Applications of Rubber in Mechanical Handling Equipment

Although the mining and quarrying industries make wide use of mechanical handling equipment, the possibilities of this medium of transportation are yet to be fully exploited. In the following article, by R. W. Parris, B.Sc., A.R.I.C., A.I.R.I., and condensed from *Rubber Developments*, Vol. 7, No. 4, and Vol. 8, No. 1, the important role of rubber as a factor in mechanical handling equipment of all kinds is discussed from the point of view of the user, and the article describes certain particularly interesting installations in various parts of the world. It will be recalled that the use of rubber in the manufacture of conveyor belts for underground use was fully dealt with by A. Grierson, B.Sc., A.M.I.Min.E., in *The Mining Journal* of December 4, 1953, and subsequent issues.

The major rubber product used in mechanical handling equipment for both surface and underground application is conveyor belting. This belting is made in a wide variety of types for conveying many different materials, amongst the most important of which are those associated with the mining and quarrying industries, namely the transportation of ores of all kinds as well as coal, coke, sand, gravels, limestone, clay, sulphur and waste rock. The British Standard B.S.490 appertains to rubber belting, but it is nevertheless important that the manufacturer should be fully informed of the destined purpose of a particular belt so that a belt designed for a specific material can be supplied.

STANDARD CONSTRUCTION

In the majority of applications, the working life of a belt is governed by its degree of resistance to abrasion, and it is of interest therefore to compare the resistance of rubber with that of other materials. Taking wear on rubber as unity, the relative degree of wear on a number of materials when subjected to a sand blast for 45 min. showed the relative wear of rubber belting to be 1.0, rolled steel 1.5, cast iron 3.5, Balata belt 5.0 and high grade woven cotton belt 6.5.

The construction of a rubber conveyor belt is well known, consisting of a cotton duck interior covered by a protective rubber coating. In the manufacturing process the cotton duck is impregnated with unvulcanized rubber and is built up in plies to the finished belt. The plied-up duck is then completely covered with suitably compounded unvulcanized rubber to a thickness depending on the degree of abrasion to which the belt will be subjected, and manufacture is completed in a large vulcanizing press or by the Roticure process. Belts are normally manufactured in widths grading up to 72 in.

Amongst the types of rubber belts manufactured for specific duties is a rubber coated steel band conveyor belt developed in Sweden which has been put under test by the National Coal Board. This belt was described in *The Mining Journal* of October 16, 1953. Belts of this type have, of course, already been installed in Sweden. The belts undergoing tests in the United Kingdom are 32 in. wide and have been cut to operate on a 600 yd. run. They are installed at Woodside Colliery, East Midlands, and Bank Hall Colliery, Lancashire. Of particular interest is the fact that when this type of belt was tested at Stoke Orchard to assess its fireproof qualities, it was found that after setting fire to the belt and submitting it to enforced draughts, the steel band conducted the heat away so quickly that the fire did not spread.

Another interesting construction is a belt intended for the handling of wet gravel, cement or other wet materials. This unit can shed water from the material being handled—or can retain the water—according to requirements. The belt is formed with moulded rubber ridges in its surface $\frac{1}{4}$ in. in height. The incline of the belt and the angle of the belt idlers are adjusted according to whether the water is to be shed or retained.

The cable belt conveyor, recently introduced, has been previously described. This equipment is not itself subjected to the driving pull, this being taken by two steel ropes, one at each side of the belt. A cable belt conveyor has been installed by the N.C.B. in the Frances Colliery, Fife, to take coal up at an inclination of 1 : 4. During its first two years of operation this belt carried 260,000 tons of saleable coal each year.

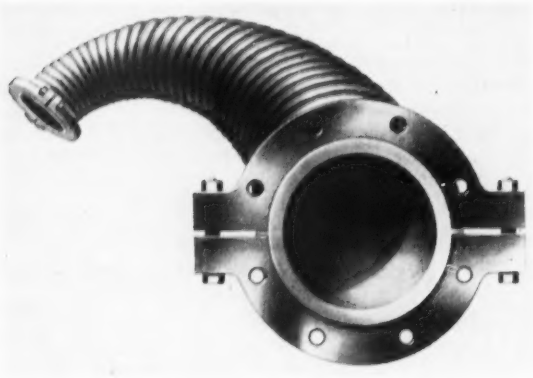
RUBBER IDLERS

Where abrasive or corrosive materials are being transported it is advantageous to utilize rubber-covered idler rollers in the belt conveyor system, while the shock-absorbing capacity of the idler can be increased by the use of rubber mountings.

At an installation in South Wales where lumps of limestone weighing approximately one ton each were being

loaded on a belt, special rubber impact idlers were provided at the loading point, with the result that £850 per annum was saved in the cost of belt replacements.

A recent development is the hammock idler, consisting essentially of a rubber tube flexed according to the belt load and which thus allows the belt to form its own shape of trough. The use of the hammock idler reduces spillage, as any tendency for the load to be riding in bad alignment is speedily corrected.



Hose fitted with Fulflex flange

Many notable installations of rubber conveyor belts have proved successful in various parts of the world. The aggregate for the Shasta Dam, United States, totalling 1,170 tons per hr., at 570 f.p.m., was transported 10 miles by a rubber belt system, while about a year ago a coal transporting belt system stretching 4½ miles was installed in Ohio. These projects are dwarfed, however, in comparison with the 103 miles long twin-belt system planned between Lake Erie and the Ohio river to serve the Pittsburgh steel and coal industries. This installation has been previously described in *The Mining Journal*.

ELEVATOR BELTS

In continuous bucket elevators, the buckets are close together on the belt and material is loaded directly into the buckets by means of a chute opposite the third bucket from the bottom on the belt, the two empty buckets serving to catch spillage. This type of elevator can be used for handling larger fragmentation in addition to pulverized material. The speed of continuous bucket elevators is about 50 to 60 per cent that of centrifugal discharge elevators.

Rubber elevator belts are of high tensile strength, designed to withstand the stresses which occur at the bolt holes where the buckets are attached, these stresses being particularly severe during loading and in passage around the end pulleys. The belt should be at least 1 in. wider than the bucket for bucket lengths up to 16 in., and 2 in. wider for bucket lengths over this dimension. Pulley faces should be at least 1 in. wider than the belts for belts up to 12 in. width, and 2 in. wider than the belt for belts over 12 in. width. The end pulleys should be of such a diameter that flexing of the belt over the pulleys is not too great to shorten its working life.

Rubber containers of various kinds are now being made from a compound of rubber and phenolic resin named Fortiflex. This compound possesses the flexibility of rubber allied to the strength and rigidity of phenolic resins. Trays made of this material are being used in conveyor systems.

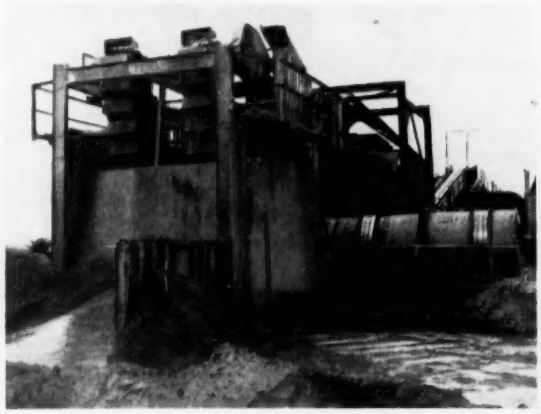
Rubber tyred steel wheels and moulded rubber wheels are used widely on power driven trucks and trailers, while a wide range of rubber tyres and wheels are manufactured for fitting to the various industrial trucks serving mechanical handling requirements in many industries. During the experimental measurement of various types of industrial wheels recently concluded, a four-wheel hand truck with a load of 580 lb. was mounted on different kinds of 6 in. dia. wheels and rolling resistance measured on a floor with a smooth surface and a floor with a rough surface. The results showed that on a smooth floor surface an all-steel wheel gave a rolling resistance of 3 lb., and a solid rubber tyre a rolling resistance of 12 lb. On a rough floor the all-steel wheel gave 200 lb. resistance and the solid rubber tyre 90 lb. resistance.

OTHER EQUIPMENTS

In addition to its use for conveying liquids, rubber hose has a wider field of application, as it is now employed for the handling of solid materials and mixtures of solid materials with liquids. A new reinforced hose designed for this type of duty is now in production in the United States. It is claimed that this "Convertapipe" hose can convey fragments of iron ore and coal up to 10 lb. in weight and 8 in. in length. The fragments are carried in a stream of water at pressures up to 250 p.s.i. The interior of the hose is made of an abrasion-resistant rubber stated, in many applications, to outwear steel 20 : 1.

The nine advantages of the use of hose for materials handling are, cheapness over short-distances, greater flexibility, less installation expense for auxiliary equipment, less maintenance than for pipes or conveyors, less loss by spillage, no wear of moving parts, simplicity of shortening or lengthening the installation, ease of transferring the hose from one location to another, and material can be transported straight up or straight down.

A special type of flange for hose used in conveying abrasives, in addition to liquids, is the Fulflex flange. This flange is made in two halves and is anchored over a metal ring embedded in the hose, no spigots or clips being required. Hose fitted with these flanges is easily installed, and



Elevator belts handling sand at Larford Colliery

it is claimed that a 6 ft. hose fitted with the flanges has the same flexibility as an 8 ft. hose fitted with spigoted flanges. The hose can be turned in a complete circle within the flanges, thus distributing wear. A 4 ft. length of 6 in. bore wire-embedded hose fitted with Fulflex flanges installed on a 90 deg. bend off the suction side of a pump at a gravel pit pumped 350 cu. yd. per day for five days a week and lasted 17 months. Previously cast iron bends had a life of three weeks.

Finally, rubber has a wide use in the manufacture of anti-vibration mountings. The efficiency of screens is increased by supporting the moving parts on rubber mounts.

The Coal Industry at Home and Abroad

In his latest report our Coal Correspondent discusses the present situation of the coal industry in the United Kingdom as well as in Europe and the United States. In particular, he points out that strike action has seriously reduced British coal output and that demands for wage increases will raise considerably the costs faced by Ruhr producers.

In Britain, further unofficial strikes have brought about a serious reduction in output. These unofficial stoppages, greater than ever before in the history of the industry, have so far this year cost the country well over a million tons of coal. At one time last month 90,000 men from 56 collieries were idle in the Yorkshire coalfield, resulting in a production loss of approximately 500,000 tons. Coming at a time when every ton of coal is vital to the industrial economy of the country these irresponsible actions have been soundly condemned by the mineworkers' union officials, and it is indeed most unfortunate that the prevailing harmonious relationship between the National Coal Board and the union should be marred by the contumacy of the rank and file.

These attempts by the workers to use power instead of reason to solve disputes are flagrant breaches of conciliation agreements between the N.C.B. and the N.U.M. So far this year coal mining has accounted for almost 50 per cent of the total time lost by strikes in all British industries—a dismal record. In the first 18 weeks of 1955 total production of coal in the U.K. is down by almost 2,000,000 tons compared to the similar period of last year.

In South Wales, traditionally a difficult area from the labour relations aspect, mass dismissals have been resorted to by the Board in an endeavour to stimulate production in pits plagued by go-slow tactics. In the eight years of nationalization the collieries in South Wales have got in the red to the staggering total of £27,000,000 and the time is long overdue for more resolute action by the N.C.B.

DRILLING AT SEA

In an attempt to obtain more precise information about the reserves of coal lying under the coastal waters of Britain the National Coal Board has initiated an undersea drilling programme. The first attempt to prove undersea coal by drilling at sea is shortly to be made in St. David's Harbour on the north coast of the Firth of Forth in Scotland. The boring will take place from a specially designed tower which has been floated out and lowered on to the sea bed, about one-and-a-quarter miles off shore from the new Seafield Colliery. The first borehole will go down to about 2,000 ft. and if the operation is successful a second borehole will be put down three miles from the shore. Thereafter, undersea drilling is projected for several coastal regions.

Although there is little doubt that coal exists in the undersea areas to be developed, it is vitally necessary in view of the large capital expenditure contemplated, that the precise location of the seams be determined in order that the mining layout can be planned to suit the structure of the measures.

As if the industry had not sufficient internal problems, the long-threatened strike of railway locomotive drivers and firemen has finally taken place. Fortunately, the effect on the coal mining industry has been cushioned by the continued working of railway staff belonging to a rival union, and at the time of writing no pit has had to close. A limited amount of stockpiling has been made necessary, but at least for the present the repercussions on the mining industry have not been so serious as originally feared. However, if the strike is protracted, there is little doubt but that the difficulty of clearing surface wagons will eventually precipitate stoppages in the coalfields.

A major policy split has developed in the Common Assembly of the European Coal and Steel Community following the decision of the High Authority to cut the levy on steel and coal which produces the income for the six nation pool. The H.A. have decided to reduce the 0.9 per cent levy on coal and steel producers of the member nations to 0.7 per cent in July and thence to 0.45 per cent by January 1, 1956. The Socialist group in the Common Assembly hold that the cut will prevent the Community from fulfilling completely its financial and social responsibilities.

The High Authority, however, states that these fears are groundless. The split does not appear to constitute a major threat to the H.A. as under the constitutional set-up in the E.C.S.C., it requires a two-third majority vote of censure by the Common Assembly to oust the High Authority. This is unlikely. The greatly increased productivity in the Community is no doubt responsible in part for the decision to halve the levy on coal and steel producers. Since the inception of the European Coal and Steel Community, output of coal has gone up by 50 per cent; iron ore output has increased by 15 per cent, and the use of steel and scrap is almost three times as great as in pre-community days.

The Ruhr coal owners have finally met the demands of the mines on the increased wage issue. This wage increase will cost the coal producers an additional 30,000,000 M. per month and to sweeten the pill the High Authority have approved increases in the permitted selling price of Ruhr coal averaging 1.25 M. per ton. The West German Government in addition have decided to withdraw at the end of June the existing one M. per ton levy used to finance workers' housing. This levy relief, coupled with the increase in selling price will give the coal owners the 2.25 M. per ton they claimed. The average price to the consumer of Ruhr coal is now in the range of 61.25 to 66.25 M. per ton.

Despite the rising output from West German collieries, the country will have to import about 14,000,000 tons of coal —half of this from the U.S.—in the year ending March, 1956, if the expansion of West Germany's economy continues at its present rate. Coal production is expected to rise by 3,500,000 tons this year to a record 131,500,000 tons, but this rise is insufficient to keep pace with the tremendous increase in internal demand. About 5,000,000 more tons of coal will be imported from the U.S. in the current year than last year in an endeavour to fill the capacious maw of German industry.

INCREASED U.S. PRODUCTION

The continuance of the world wide industrial boom is naturally giving intense satisfaction to the coal producers in the U.S. Output of bituminous coal is up by 12 per cent compared to this time last year and some producers are predicting that 450,000,000 tons will be mined in 1955. Increased home consumption and a rapid increase in export trade have at least temporarily taken the U.S. coal trade out of the doldrums where it has been languishing for some years.

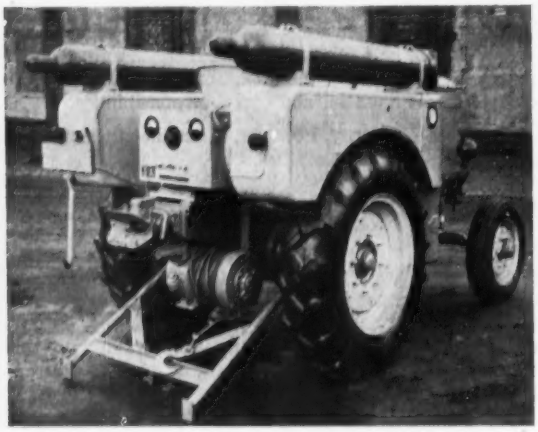
Last year the U.S. sold approximately 15,500,000 tons of coal overseas and this figure may be doubled this year.

On the technical side, a continuous mining machine has been developed capable of producing eight tons of coal per minute. The machine, which weighs 40 tons, can cut and load a face of coal 13 ft. wide and 8 ft. high in one operation. It has been developed by the Joy Manufacturing Co.

MACHINERY AND EQUIPMENT

A Mobile Tractor Workshop

An interesting machine has been developed by Orenstein and Koppel of Dortmund, Germany, namely a multi-purpose tractor which combines the six functions of tractor, compressor, welding generator, oxygen flame cutting unit, electric lighting plant and winch. There are two units, UK 1 and UK 2, which when used as a fully fledged tractor have outputs of 40 and 55 h.p. respectively.



The Type UK 1 diesel compressor tractor

The 4-cylinder V diesel engine of this tractor can be converted to compressed air action by simple changing of two control levers, resulting in two cylinders continuing to fire and two compressing. The air delivery is 113 cu. ft./min. Automatic compressor regulation guarantees economic operation. The full power output of the engine can be ultilized via a secondary transmission to drive a D.S. Arc welding generator of 450 amps capacity which is mounted behind the driver's seat. This generator can also be used for lighting purposes by feeding 75 electric bulbs of 100 watt each. In addition, by providing oxygen bottles, the generator is used for flame cutting by the Arcos-Oxyarc method.

If desired, the autogenous system can also be applied if an oxygen bottle is replaced by an acetylene bottle. The D.C. welding generator can be replaced by a three phase generator with an output of 20 kVA to supply electric current for saws, drills and other electric appliances, while in addition a rope winch can also be fitted to the tractor if required. The winch has a capacity of 3 tons for the UK 1 and 6 tons for the UK 2 and can be used simultaneously either during compressor operation or when welding is being undertaken. The machine is a useful unit on any mine or working site.

A New Timber Preservative

Hickson's Timber Impregnation Co. (G.B.) Ltd., announce the introduction of a new waterborne general purpose timber preservative. This will be known as Hickson's Tanalith C and will be applied to timber by vacuum/pressure impregnation. It will be a valuable addition to the Hickson range of preservatives and will complement their well known Tanalith U which has, outstandingly, the widest usages of any waterborne preservative throughout the world.

Work on its formulation, application to timber, laboratory tests and field tests have been proceeding for some years and when it comes into general use the efficiency of Tanalith C will have been proved beyond question.

This preservative is already in production and is in bulk use at some timber treatment depots. When the new manufacturing plant, now in course of erection at Castleford is completed, Tanalith C will be available for use to any licensed user of Hickson's processes, under their new patent application.

The most striking feature of the new product is its high fixation—higher than any other commercial waterborne preservative on the market, and comparable with Creosote. Tanalith C was formulated primarily to inhibit the attack of the recenlty discovered soft rot fungi which causes breakdown of wet timber and timber in the ground. In addition the new preservative gives full protection against white and brown rots, wood destroying borers and termites and, consequently, it can be used for the preservation of any timber where Tanalith U is now employed. Tanalith C is particularly suitable for cooling tower work and timbers in sea water.

Infra-Red Analyzers

Continuous infra-red analyzers to control the purity and output of the process stream are being successfully used by the American Cyanamid Company's $50,000,000 petrochemical plant in Fortier, according to the Perkin-Elmer Corporation, manufacturers of the instruments. The analyzers enable plant operators to know exactly, at any moment, what the composition of the product stream is, thereby saving delays occasioned by conventional analytical methods.

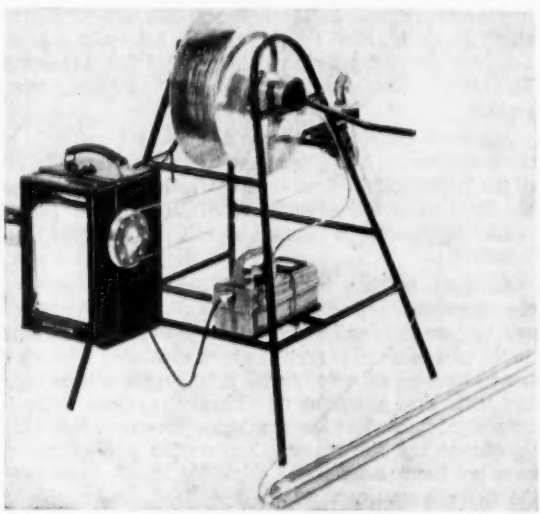
The instruments are said to represent a new concept in chemical plant operation, namely that of control by stream composition rather than stream environment. This is the first time that such continuous analytical controls have been incorporated into the process stream of a chemical plant of this size.

Measuring Radioactivity to 6,000 ft. depth

The new Deep Drill Hole Scintilogger announced by The Radiac Company, Inc., United States, was designed for the radioactivity logging of drill holes to six thousand feet. Its verified in-hole-out-hole radiation profiles indicate deeply buried uranium deposits and identify oil productive zones in new wells as well as new productive zones in old wells.

The Scintilogger is a portable, self-contained well logging system which includes a scintillation well logging probe, a minimum 2,000 feet of cable, surface control box and graphic strip chart recorder synchronized to a footage counter mounted on a stand containing the payout and take-up reel. The stainless steel probe, which is 36 in. long and 2 in. in diameter, may be weighted to assure complete descent through water and mud in uncased holes. It is mounted on a steel cable having a breaking strength of 1,500 lb. and a rated strength of 900 lb.

Time constants (1, 4, and 16 sec.) and sensitivity ranges (600, 1,800 and 6,000 c.p.m.) are controlled at the surface



The Deep Drill Hole Scintilogger

to provide the operator with as much or as little detail in his log as he desires. Sections of interest can be re-logged at expanded scale or at other sensitivities while in the well. The log can be correlated with electric logs and cores while in operation and graphically illustrates changes in lithology exactly as they occur, with the same sharp breaks or gradations. Because of the Scintilogger's accurate correlation with core samples, it is used to supplant expensive core drilling operations.

Shipping of Sulphur as Liquid

A new method of shipping sulphur over long distance water routes—as a liquid instead of a solid—was inaugurated in the United States early in May. The first two of three new insulated barges each took on a 2,500-ton cargo of melted sulphur at a temperature above the boiling point of water and began a tow up the Mississippi River to a plant, 1,100 miles and eight days away. The sulphur was loaded at Freeport Sulphur Company's docks at Port Sulphur, 45 miles south of New Orleans. It will be used in National Lead Company's titanium division plant at St. Louis.

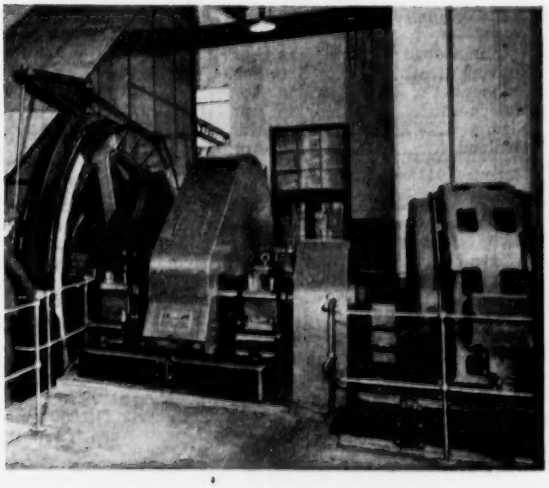
The three barges, built by Ingalls Shipbuilding Corporation and operated by Coyle Lines, Inc., are insulated with 4-in.-thick foam glass and are equipped with boilers and heating coils to maintain a minimum temperature of 260 deg. F., 20 deg. above the melting point of sulphur. The sulphur is piped into the barges in the same liquid state in which it is mined—instead of being cooled and solidified and then shipped in solid chunks. Dust loss is prevented, moisture is avoided, contamination is reduced, and re-melting at the consumption point is eliminated.

An A.C. Winder With Speed Control

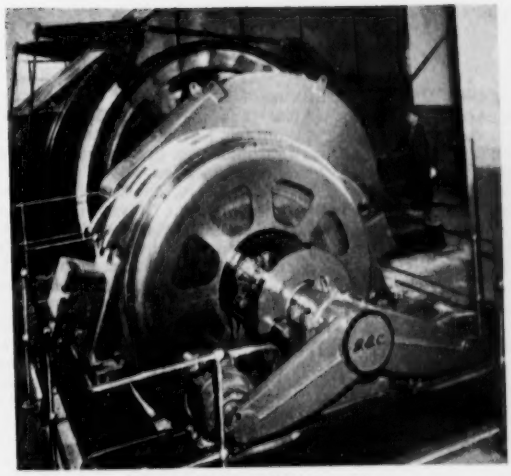
For the modernization of the winding plant at Avon Colliery, South Wales, the General Electric Co. Ltd. was commissioned to supply and install a complete electrically-driven winding engine to replace the existing steam engine. The contract covered a 1,100 h.p., 3.3 kV, 475 r.p.m. slipring motor with its associated control gear and the supply of a new parallel winder drum, 12 ft. dia. x 8 ft. wide, which was built at the Company's Erith works.

With a depth of wind of 1,575 ft., the plant is designed to raise approximately three tons of coal or five-and-a-half tons of stone per wind, the winding cycle being acceleration 10 sec., full speed 36.3 sec., deceleration 10 sec., and decking 20 sec. This represents about 47 winds per hour, giving an hourly output of some 140 tons of coal.

The installation is of particular interest since it is the first A.C. winder in this country to use the new G.E.C. system of dynamic braking and speed control. The new G.E.C. dynamic braking and control system with speed control features is a further development of a similar scheme installed for four 4,200 h.p. A.C. winders in the Orange Free State Goldfields. The first



The 1,000 h.p. geared A.C. winder



The 1,000 h.p. slipring motor

two of these were commissioned some three years ago. On that occasion the system was designed to give accurate torque control and the subsequent performance of these winders has fully substantiated the claims made. With the additional feature of speed control, a direct relationship is afforded between the steady rope speed and the position of the driver's lever.

Automatic variation of the rotor circuit resistance of the winder motor is effected through the medium of an oil servo mechanism, the operating valve of which is governed by two control coils, acting in opposition to each other. The coil, which causes the resistance in the rotor circuit to be reduced, is energized by alternating current. When driving, this current varies with the speed error. During dynamic braking, this current is constant.

A further coil which serves to insert resistance, is excited from the stator or secondary winding of a control generator driven from the winder motor. At any given rotor, or primary, excitation of the control generator, the voltage across this coil reflects that of the rotor of the main winder motor and varies in proportion to the slip or speed. The actual proportion is dependent upon the speed error.

A Self-Priming Fire-Fighting Pump

A new self-priming pump introduced by Pegson Ltd., is known as the 27 HC-1D Fire Pump, and can be converted speedily into a mobile set by bolting the base plate onto a trailer frame.

Basically the pump has been designed for fire-fighting applications. It is close-coupled to a Petter diesel engine giving a compact and easily manoeuvrable set. The suction branch is screwed 3 in. London Fire Brigade round thread and is provided with a chromium plated blanking-off cap and chain. The twin discharge branches take 2½ in. instantaneous couplings, incorporate hand-operated infirmary pattern, flow-regulating valves and are likewise fitted with blanking-off caps and chains. The pump incorporates the exclusive Pegson-Marlow diffuser priming feature whereby self-priming is achieved without any auxiliary mechanism. It has an aluminium alloy main tank designed to withstand high pressures. Direct coupling to the engine crankshaft eliminates outboard bearings.

High Speed Tunnelling

In an article entitled *An Experiment in High Speed Tunnelling*, published in our issue of May 27, it was stated that during the excavation of the Allt-na-Lairige tunnel in Argyle ventilation and compressed air pipes were chain-slung from the roof by eye bolts screwed into ½ in. dia. Rawlplugs. This should, of course, have read Rawlshields. Rawl hook or eye bolts range in diameter from 3/16 in. to ½ in. at overall length from 2½ in. to 6 in., the shields varying from 11/32 in. dia. and 1½ in. length to ¾ in. dia. and 3½ in. length. It is of interest to note that Rawl eye bolts were used several years ago for the fixing of service lines in one of the South Yorkshire coal mines.

METALS, MINERALS AND ALLOYS

COPPER.—With deliveries of 10,400 tons of diverted copper in April and about 16,000 tons in May from the D.P.A. inventory (established during the Korean war to meet emergency requirements from U.S. industry), these stocks have now been run down to what are described in Washington as negligible proportions. With this useful source of government held copper (technically outside of the stockpile) no longer available, the Administration has now taken the step of diverting to private use copper scheduled for delivery to the Business and Defence Services Administration. A few thousand tons due for delivery in the second quarter and about 17,000 tons in the third quarter are to be so dealt with.

How far this will ease the continuing tight supply position in the States seems to depend largely on whether in fact this metal reaches those who are most greatly in need—mainly the small independent firms who have recently been paying as high as 43 c. per lb. for nearby delivery. Some uncertainty has been added to this prospect by last week's announcement that the Department of Commerce will no longer supervise the distribution of copper to industry either from the D.P.A. inventory (now apparently in any case exhausted) or from scheduled deliveries under the Stockpiling and Defence Production Acts. Washington can no doubt point to aluminium as a precedent for this, although a significant difference is that whereas aluminium producers are required to make a certain proportion of diverted deliveries available to non-integrated fabricators, copper producers are apparently to be under no such obligation and it is this which seems to make the eventual destination of the diverted copper somewhat uncertain. Incidentally, both with copper and with aluminium there is apparently no stipulation that the diverted copper must be sold to U.S. consumers—a fact which may have some importance in the case of foreign producers with U.S. Government contracts.

Meanwhile, the supply position in the States continues exceedingly tight with about 17,000 tons of July copper and 12,000 tons of August copper already sold, and there is such widespread need for rebuilding stocks that the downturn in industrial activity during the holiday period is unlikely to afford any relief to the order books. All the indications are that the market will remain tight at least until the end of this year. U.S. domestic copper production was running at about 100,000 tons a month during the early part of this year and even if all strikes are averted in the present season of wage negotiations which is now a perennial feature of the summer months, there seems little prospect of this rate being improved on during the rest of the year. Domestic consumption during the first four months of this year has averaged 128,500 tons, while over the same period net imports have averaged about 22,500 tons leaving a deficit of some 6,000 tons which up till now has been largely met by diversions from government stocks.

So long as the world price continues to be subsantially above the official domestic 36 c. level, it is difficult to see the Chilean Government allowing more copper into the States than the minimum required to honour its obligations. In the absence, therefore, of any unexpected falling off in industrial activity, it would look as if the Administration is going to have to continue its emergency diversion arrangements until such time as the producers boost the domestic price nearer to current world prices. Clearly they will be unwilling to do this so long as Washington is prepared to help them out, so that the issue really comes back to one of how far the Administration is prepared to postpone stockpile and defence production deliveries in the interests of keeping copper prices within bounds.

The U.S. Senate has now approved and sent to the White House a bill extending to June, 1958, the present suspension of the 2 c. per lb. copper import duty.

On the expiry of the first 30 day period of R.S.T.'s stabilized price plan it was announced by the Anglo Metal Company—the firm responsible for R.S.T. copper sales—that no statement would be made by R.S.T. on its future price policy unless and until it was decided to alter the present price basis of £280 per ton. In thus deciding not to take the first opportunity of bringing that price level nearer to current L.M.E.s prices, R.S.T are clearly seeking to re-emphasize their conviction that the latter are too high, and in this connection it has been pointed out by Anglo Metal that there has been no increase in the American or Belgian producers' prices.

This is true enough, but as virtually all the American and Belgian producers of copper are sold out, these pegged prices are not, in fact, prices at which copper is obtainable by someone who has not got any or who needs more than his existing quota. That is why copper is changing hands in New York at up to 43 c. and on the L.M.E. at around £340. Copper seems destined to remain tight for many months yet, and we cannot suppose that R.S.T. is prepared to contemplate indefinitely a situation in which they are selling their copper at £50 or more a ton below the price being realized by other Commonwealth producers.

In a strike ballot taken earlier this week by members of the African Mineworkers' Union employed on the Roan Antelope mine, there is reported to have been a two to one vote in favour of strike action against the alleged victimization of 23 Africans discharged from the labour pool. This, presumably, refers to the surplus labour pool which was established on each Copperbelt mine for the redeployment of members of the Union who came out on strike earlier this year and subsequently were temporarily redundant owing to the mines having taken on a number of non-Union natives during the period of the strike.

LEAD.—Lead has continued a quiet market in the States at 15 c. Domestic output for April totalled 28,697 s.tons against 30,961 in March. U.S. stocks of refined lead held by smelters and refiners showed a further decline at the end of April at 43,207 s.tons against 47,496 a month earlier, while battery shipments during the first four months of this year have totalled 5,727,000 units compared with 5,554,000 units in the corresponding period of last year.

TIN.—The House of Representatives has passed a resolution to keep the Texas smelter in operation for another year under Government ownership. The resolution also recommends the establishment of a permanent tin smelter in the U.S. and asks the President to appoint a commission to investigate how this may be achieved, including the possibility of turning the smelter over to private ownership. Congress has, of course, been through all these motions before, but we fear the economic facts of the situation are still against it.

With the Texas smelter in operation for another year the immediate implementation of the I.T.A. is, of course, no longer a matter of urgency but having regard for the painful slowness with which each step towards ratification has so far been made, it is none too soon to be tackling the obstacles which have yet to be overcome to ensure its operation even by the beginning of next year. Whatever may have been the quite genuine legislative delay over Indonesia's ratification until even a month or so ago, the problem of obtaining her signature is now further complicated by the necessity of convincing her that the Texas lobby can scarcely hope indefinitely to be successful in keeping the smelter going at the taxpayer's expense, and that even if this were to happen it does not automatically follow that stockpiling would continue.

Latest production figures which we give below for the main producing countries suggest that mine output is still slightly on the increase. The increase in the Congo is, however, more apparent than real as last year's figures in the opening months were quite unrepresentative. The total for the corresponding period in 1953 was 4,403 tons. Of greater interest, however, is the increase in world consumption which has been recorded during the first three months of this year the figures being 36,300 tons compared with 32,800 tons in the corresponding period a year ago.

Country	*Period*	*1955*	*1954*
Belgian Congo	Jan.-Apr.	4,827	2,919
Bolivia*	Jan.-Feb.	4,460	3,934
Indonesia	Jan.-Apr.	8,941	10,289
Malaya	Jan.-Apr.	20,007	19,386
Nigeria	Jan.-Mar.	2,112	2,044
Thailand	Jan.-Apr.	3,200(E)	3,084

* Exports E Estimated

ZINC.—In New York the pressure on the zinc price is growing and a price rise seems increasingly likely, given a speedy ending to the automobile strikes, which, however, do not appear to have been entirely resolved by the signing of the new agreement between Ford and the United Autoworkers. In fact the only rise reported last week was for zinc oxide where producers have raised their price by ¼ to ½ c. High grade zinc is reported to be already oversold for this month.

U.S. production of slab zinc in May totalled 86,117 s.tons compared with 83,786 in April and 73,654 in May a year ago. Stocks at the end of May were again down at 63,184 s.tons compared with 74,579 tons in April, and nearly 210,000 tons a year ago. U.S. domestic mine production in April is reported at 42,400 s.tons against 47,200 tons in March.

The new electrolytic zinc plant of the Bleiberger Bergwerks-Union at Gailitz in Corinthia is reported to be undergoing its trials. The plant has been designed for an annual capacity of

10,000 tons but is expected for the present to operate only at 60 per cent capacity. Even so the high grade zinc produced will not be fully absorbed by Austrian industries and will be available for export. On the other hand Austria will have to continue to import considerable quantities of crude zinc.

ALUMINIUM.—We are repeatedly getting glimpses these days from the States of the tremendous growth potential of the aluminium industry. The most recent pointer comes from the sales development division of Alcoa, which has estimated that the average 1955 model American car is carrying about 30 lb. of aluminium, representing in total some five per cent of current domestic primary production. This figure already represents a sharp increase over only a few years ago, yet it is estimated that on current trends consumption might be as high as 100 lb. per car by 1970 while Alcoa's development engineers have estimated that it might eventually be feasible to fabricate automobile components in aluminium to an extent of over 250 lb. per car.

In other words, there would appear to be a potential market for aluminium in the American automobile industry alone, equivalent to about half of the present total U.S. production of primary metal. When these figures are put alongside similar estimates which have from time to time been made for other aluminium using industries, the present tight position in aluminium supplies seems hardly surprising, and indeed, for many years yet the growth of aluminium usage seems likely to be determined almost entirely by the rate at which productive capacity can be expanded economically, bearing in mind that much of aluminium's success has been due to its relatively stable price and—on a volumetric basis—its relative cheapness. These considerations must be very much in the Industry's mind at the present time with Washington reviewing the idea of a third round expansion programme of domestic production.

Meanwhile aluminium users in the States were last week busy impressing on the B.D.S.A. the need for the continuation of stockpile diversions into the third quarter and that other shipments for government account due to be completed by September 30 should be extended to October 31. It was also being urged that aluminium scrap exports should be limited to 500 tons a month.

TITANIUM.—A U.S. Senate Armed Services Sub-Committee has recently spotlighted much of the uneasiness which has of late been expressed in the States by titanium users about the Administration's present titanium programme. The report questions the Administration's wisdom in having pressed on with production at the urging of the Defence Department at the expense of a more extended research and development programme. According to the report, the production programme which aims at an eventual production of 35,000 tons per annum, has so far resulted in the government acquiring only a total of 4,000 tons of sponge at an average cost of $9,000 per ton ($4.50 per lb.). Despite the potential usefulness of titanium in many fields, the report charges that its actual performance has not reached expected targets. The metal is particularly difficult to fabricate and has shown a tendency to break down under extremely high temperatures applied over long periods. As a result producers have been unloading production of an unacceptable quality onto the government in increasing quantities. It is clearly the view of the Committee that in this instance the Administration would be well advised to *réculer pour mieux sauter*, which would presumably involve scrapping the existing production expansion programme and diverting funds to greatly intensified research.

The London Metal Market

(From Our Metal Exchange Correspondent)

The ill-luck which has persistently dogged the copper market since its re-opening continues with the renewed possibility of a further strike of native workers in the Rhodesian copper belt. It was this report, combined with the mounting effects of the dock strike, which caused the firm market of the last few days and the wider backwardation. The demand for cash metal has been heavier than of late, and it is known that some consumers have been taking delivery of physical metal to replace that which is strike-bound in ships.

The effects of the rail strike have not been appreciable, and any downward movement which might have been caused has been masked by the more powerful "bullish" factors. Another contributory factor to the strength of the market has been hedging operations undertaken by buyers in the recent Government sale of 15,000 tons electrolytic copper, as they make fixed price sales. There is no information available at the moment as to the timing of the sale of the final 13,000 tons of electrolytic copper which the Government have announced they intend to dispose of for delivery during November and subsequent months.

Demand in America has remained at a high level, and in Europe more works are being forced to buy to cover in their immediate requirements than has been the case for several weeks, and in a number of instances difficulty has been experienced in finding free parcels of metal for reasonably early delivery. Most people consider that, while the supply position may become easier to the extent of lessening the premium which exists between the London Metal Exchange and American quotations, a general recession in copper prices cannot be anticipated before the end of the year.

The firmer undertone in lead and zinc continues in spite of a flurry caused by the near breakdown of negotiations to prevent the strikes at the Ford Motor Company's plants in the United States.

The tin picture remains unchanged with a little more interest being shown in the metal, probably resulting from the almost certain continuation of the Texas smelter for another year. On Thursday morning the Eastern price was equivalent to £738 per ton c.i.f. Europe.

Closing prices and turnovers are given in the following table. The tonnage figures for June 2 represent only four days of trading.

	June 2		June 9	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Copper				
Cash	£342½	£345	£340½	£341
Three months	£328½	£329½	£324	£324½
Settlement	£345		£341	
Week's turnover	1,820 tons		4,425 tons	
Tin				
Cash	£717	£718	£721	£721½
Three months	£717½	£718	£721½	£722
Settlement	£718		£721½	
Week's turnover	470 tons		545 tons	
Lead				
Current half month	£103	£103½	£102½	£103
Three months	£102½	£105	£102½	£103
Week's turnover	1,925 tons		2,725 tons	
Zinc				
Current half month	£91½	£91½	£90½	£91
Three months	£89½	£89½	£89½	£89½
Week's turnover	1,700 tons		5,050 tons	

OTHER LONDON PRICES — JUNE 9

METALS

Aluminium, 99.5%, £163 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60% basis) 22s./24s. nom. per unit, c.i.f.
Bismuth
(min. 2 cwt. lots) 16s. lb.
Cadmium (Empire) nominal
Chromium, 6s. 5d./7s. lb.
Cobalt, 21s. lb.
Gold, 250s. 11d.
Iridium, £30 oz. nom.
Manganese Metal (96%-98%) £255/£265 according to quantity
Magnesium, 2s. 4d. lb.
Nickel, 99.5% (home trade £519 per ton
Osmium, £30 oz. nom.
Osmiridium, £40 oz. nom.
Palladium, £6 12s. 6d./£7 5s. oz.
Platinum, £27 10s./£29
Rhodium, £40
Ruthenium, £16 oz.
Quicksilver, £108 ex-warehouse
Selenium, 43s. nom. per lb.
Silver, 78¼d. f.oz. spot and 77¾d. f'd
Tellurium, 15s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 60% 8s. 3d. lb. c.i.f.
20% 3s. 3d. lb. c.i.f.
Chrome Ore—
Rhodesian Metallurgical (semi-friable) 48% £13 per ton c.i.f.
" Refractory 45% .. £13 per ton c.i.f.
" Smalls 42% .. £10 2s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26-£27 d/d
Magnesite, Raw .. .. £10-£11 d/d
Molybdenite (85% basis) .. 105s. 3d.-108s. 1d. per unit c.i.f.
Wolfram and Scheelite (65%) .. 250s./257s. 6d. c.i.f.
Tungsten Metal Powder .. 20s. 0d. nom. per lb. (home) (98% Min. W.)
Ferro-tungsten (80%-85%) .. 17s. 0d. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £37 6s. 3d. d/d per ton
Ferro-manganese, home .. £53 17s. 6d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. 80d./81d. per unit
Manganese Ore (38%-40%) .. 67d./69d. per unit
Brass Wire .. .. 3s. 3d. per lb. basis
Brass Tubes, solid drawn .. 2s. 7¼d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

The past week has been an extremely interesting one on the Stock Exchange. In spite of the railway strike the underlying strength of the markets was convincingly demonstrated by the strength of equity shares and the disposition of investors to take a long term view. American buying of certain leading securities further encouraged the market. The United Kingdom gold returns for May remained virtually unchanged but it should be remembered that these referred to a pre-strike period and that undue optimism on this account would be dangerous.

South Africans were still partially under the influence of the May returns and finance shares were appraised in a new light following the marked improvements disclosed in the figures.

End of account selling in London upset earlier optimism at Johannesburg and prices among individual Rand mines finished irregularly. It is pointed out from the Cape that the end of the South African Parliamentary session on June 18th may well bring a steadier tone to markets. Demand was noticeable for Far West Rand shares, particularly Dominion Reefs, Hartebeestfontein and Vaal Reefs. On the other hand, the failure of Randfontein's uranium production to offset the reduction in gold profits to any marked degree caused a sharp fall in the price. The good returns from West Driefontein also passed unnoticed and the shares closed easier on balance.

In the Orange Free States, the feature of the week was the proposal for the flotation of the Saaiplaas lease; details have not yet been announced but the lease formula has been made known and the flotation will be under the auspices of the Consolidated Goldfields group. The property is adjacent to Harmony and President Steyn. An inrush of water on the 47th level on the Free State Geduld No. 2 shaft area caused a sharp drop in the shares. Harmony were a good market following the satisfactory returns and the improvements in the position of Loraine brought buyers for the shares. The two President mines suffered from end of account influences and St. Helena were lower due to a go-slow strike at the property.

There was little change among West Africans. The improved returns from Ariston had no effect on the shares but there was some quiet buying of Ashanti. It is understood that a scheme for the amalgamation of Konongo and Lyndhurst Deep is being re-examined by the Boards.

Coppers rose to new heights due to the continued strength of the metal price. Chartered went above 60s. and most of the leading Rhodesian properties were in demand. A sharp improvement occurred in the profits of Indian Copper. The company is paying an increased dividend, and shares changed hands at 6s. A strike vote by African miners at Roan Antelope caused the shares to finish slightly lower over the week. The strong position of Rio Tinto coupled with the proposals for a bonus issue of Ordinary and Preference shares, brought in buyers, especially from Paris. A maiden dividend by the Benguela Railway Company caused a sharp rise in Tanganyika Concessions which owns some 90 per cent of the equity.

There was active trading but price changes were erratic. The more favourable outlook for Kamunting which has recently been engaged in moving two of its dredges, brought in buyers for the shares.

In the miscellaneous section, London Tin and British Tin Investment, both forged ahead because of higher dividends from some mines. Beralts dropped 1s. due to the lower tungsten price.

In the lead/zinc market the favourable metal prices, coupled with satisfactory reports from Consolidated Zinc and New Broken Hill, brought about some rises in price. Mount Isa, the brightest feature in this market, were affected by this and also by the price of copper.

Among miscellaneous base metal shares, Associated Manganese gained ground and Consolidated Murchison were also in demand. The rise in Turner and Newall to a new peak reflected the strength of industrial shares rather than any special interest in asbestos.

Canadian mines generally showed little change but International Nickel were firm. Noranda improved sharply following the metal market.

Finance	Price June 8	+ or — on week
African & European	3 7/16	—1/16
Anglo American Corpn.	8 5/16	.....
Anglo-French	20/6	—3d
Anglo Transvaal Consol.	27/6	.....
Central Mining (£1 shrs.)	41/-	+1/6
Consolidated Goldfields	59/4½	.....
Consol. Mines Selection	36/3	—7½d
East Rand Consols	2/6	.....
General Mining	4 9/16	+1/16
H.E. Prop.	9/10½	—1½d
Johnnies	36/6	+3d
Rand Mines	1 1/16	+1/16
Rand Selection	40/7½	—4½d
Union Corporation	38/6	+1/-
Vereeniging Estates	4 1/16	+1/16
Writs	41/3	—7½d
West Wits	40/6	+6d
Rand Gold		
Blyvoors	29/-	.....
Brakpan	6/3	.....
Buffelsfontein	34/-	+6d
City Deep	12/-	—6d
Consol. Main Reef	21/10½	.....
Crown	48/1½	.....
Daggas	56/10½	+7½d
Dominion Reefs	34/4½	+1/10½
Doornfontein	25/9	—3d
Durban Deep	30/7½	.....
E. Champs	6/3	3d
E. Daggas	10/6	—3d
E. Geduld (4s. units)	29/-	.....
E. Rand Props.	3 1/16	+1/16
Geduld	4¼	+1/16
Govt. Areas	7/-	—6d
Grootvlei	20/6	+6d
Hartebeestfontein	32/9	+1/3
Libanon	8/4½	+1½d
Luipaards Vlei	20/9	—9d
Marievale	20/3	+6d
New Kleinfontein	7/6	.....
New Pioneer	13/9	—3d
Randfontein	52/6	—2/6
Robinson Deep	17/9	—3d
Rose Deep	13/6	—3d
Simmer & Jack	3/7½	.....
S.A. Lands	24/4½	+7½d
Springs	2/3	—1½d
Stilfontein	27/9	+6d
Sub Nigel	38/9	+1/3
Vaal Reefs	33/-	+1/6
Van Dyk	3/6	—3d
Venterspost	13/3	+3d
Vlakfontein	17/-	+9d
Vogelstruisbult	30/9	—6d
West Driefontein	5 1/16	—1/16
Rand Gold contd.		
W. Rand Consolidated	43/1½	+1/1½
Western Reefs	38/9	—1/10½
O.F.S. Gold		
Freddies	3/9	—3d
Freddies Consolidated	5/6	—3d
F.S. Geduld	4 1/16	1/2
Geoffries	15/9	—6d
Harmony	34/-	+6d
Loraine	9/-	+6d
Lydenburg Estates	18/9	—1/10½
Merriespruit	10/7½	+1½d
Middle Wits	17/-	+6d
Ofsits	3 1/16	1/16
President Brand	68/1½	—1/3
President Steyn	34/6	—2/6
St. Helena	28/6	—9d
Virginia Ord.	14/-	—1½d
Welkom	21/-	—1/-
Western Holdings	4¼	0
West African Gold		
Amalgamated Banket	2/3	—1½d
Ariston	6/6	.....
Ashanti	24/-	+6d
Bibiani	4/9	.....
Bremang	1/4½	.....
G.C. Main Reef	3/1½	.....
Konongo	2/10½	—1½d
Lyndhurst Deep	1/3	.....
Marlu	1/3	.....
Taquah	2/3	.....
Western Selection	10/-	—4½d
Australian Gold		
Gold Minesof Kalgoorlie	13/-	.....
Great Boulder Prop	10/-	.....
Lake View & Star	17/3	+1/3
Mount Morgan	19/3	.....
North Kalgurli	7/-	.....
Sons of Gwalia	5/-	.....
Western Mining	9/-	.....
Miscellaneous Gold		
Cam & Motor	8/7½	+3d
Champion Reef	3/10½	.....
Falcon Mines	7/6	+6d
Globe & Phoenix	23/6	.....
G.F. Rhodesian	6/1½	—3d
Motapa	1/4½	.....
Mysore	4/3	—1½d
Nundydroog	5/9	.....
Ooregum	4/6	.....
St. John d'El Rey	12/6	.....
Zams	47/6	—1/3
Diamonds and Platinum		
Anglo American Inv.	8 3/16	.....
Casts	24/9	.....
Cons. Diam. of S.W.A.	7	.....
De Beers Defd. Bearer	6 1/16	+1/16
De Beers Pfd. Bearer	1 5/16	+1/16
Pots Platinum	8/3	+3d
Waterval	14/4½	.....
Copper		
Bancroft	40/3	.....
Chartered	60/3	+1/10½
Esperanza	4/4½	.....
Messina	8 1/16	+1/16
Nchanga	14 1/16	+1/16
Rhod. Anglo-American	104/-	+3/9
Rhod. Katanga	20/6	+2/-
Rhodesian Selection	38/4½	+1½d
Rhokana	39	+1
Rio Tinto	61xd	+1½
Roan Antelope	26/10½	—4½d
Selection Trust	76/3	—9d
Tanks	7 1/16	+1/16
Tharsis Sulphur Br.	7½	—¼
Tin (Eastern)		
Ayer Hitam	32/6	+6d
Gopeng	9/-	.....
Hongkong	7/6	+3d
Ipoh	23/6	.....
Kamunting	7/9	+3d
Kepong Dredging	3/3	—1½d
Kinta Tin Mines	13/6	.....
Malayan Dredging	8/10½ xd	.....
Pahang	11/4½	—1½d
Pengkalen	11/7½	+4½d
Petaling	9/4½	.....
Rambutan	18/6	.....
Siamese Tin	7/3xd	—1½d
Southern Kinta	18/-	—1½d
S. Malayan	8/-xd	—1½d
S. Tronoh	10/3	—3d
Sungei Kinta	12/-	.....
Tekka Taiping	6/3	.....
Tronoh	8/6	—1½d
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	13/-	.....
Beralt Tin	31/9	—1/-
Bisichi	7/1½	.....
British Tin Inv.	21/-	+1/-
Ex-Lands Nigeria	2/7½	.....
Geevor Tin	13/-	.....
Tin (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	2/3	.....
Jantar Nigeria	7/-	.....
Jos Tin Area	14/-	+3d
Kaduna Prospectors	2/4½	.....
Kaduna Syndicate	3/-	+6d
London Tin	8/3	+9d
United Tin	2/1½	.....
Silver, Lead, Zinc		
Broken Hill South	53/-	+3d
Burma Corporation	2/9	.....
Consol. Zinc	48/6	+9d
Lake George	11/6	—9d
Mount Isa	52/-	+1/3
New Broken Hill	35/6	—3d
North Broken Hill	73/9	.....
Rhodesian Broken Hill	13/6	+4½d
San Francisco Mines	23/6	.....
Uruwira	6/6	—1½d
Miscellaneous Base Metals and Coal		
Amal. Collieries of S.A.	49/-	+6d
Associated Manganese	36/-	+1/9
Cape Asbestos	10/10½ xd	+1½d
C.P. Manganese	35/6xd	.....
Consol. Murchison	68/9	+2/6
Natal Navigation	2½	—1/16
Turner & Newall	115/6	+3/6
Wankie	17/10½	+1½d
Witbank Colliery	4	—1/16
Canadian Mines		
Dome	$30	.....
Hollinger	$44xd	.....
Hudson Bay Mining	$112	—3
International Nickel	£126	+½
MiningCorpn. ofCanada	$7½	—⅛
Noranda	£98	+⅝
Quemont	8¼	—½
Yukon	4/6	.....
Oil		
British Petroleum	104/6 xd	+9/-
Apex	30/6	+1/6
Attock	46/10½	—7½d
Burmah	6 3/16 xd	+1/16
Canadian Eagle	51/-xd	+1/-
Mexican Eagle	21/9	.....
Shell	6½	+½
Trinidad Leasehold	32/9	+1/6
T.P.D.	23/3	+3d
Ultramar	33/3	+1/3

COMPANY NEWS AND VIEWS

Consolidated Zinc's Improved Liquidity

Group balance sheet figures of The Consolidated Zinc Corporation as at December 31, 1954 reflect the recent issue of 2,182,649 ordinary shares at par in the ratio of one for three. Capital and reserves at the year end stood at £22,403,798 as compared with £19,487,516 previously. Quoted investments, shown separately on the balance sheet for the first time, at £1,840,435 had a market value of £3,800,613 while the liquid position revealed a considerable improvement at about £9,600,000 from £6,300,000. Tax reserve certificates together with cash amounted to some £5,000,000 as compared with under £2,400,000.

In his statement to shareholders of the Corporation, Mr. John R. Govett, the chairman, made some interesting comments regarding the U.S. Administration's decision last August regarding stockpiling of lead and zinc. It was, he feared, the effect of this development that had resulted in a combined price of about £175 for lead and zinc during the past financial year (the price level which Mr. Govett previously had said would prove satisfactory to the group) rather than the achievement of any balance between production and consumption. During the past nine months deliveries of both lead and zinc to the stockpile had been on a scale sufficient to allow stocks of these metals to fall to comfortable levels. Gradually, increasing consumption of both metals had also narrowed the gap between supply and demand. But there was little doubt that if present prices were maintained by any artificial stimulus there would be a tendency for production to increase rather more rapidly than consumption. If, therefore, the prop which the stockpile had given to the market were removed, a fall in prices could be anticipated.

Net profits earned by the Corporation during the year made a marked advance to £2,383,378 from £1,393,022. A total of £1,500,000 (£1,130,000) was transferred to reserve and dividends absorbed £2,463,393 as against £1,781,002. The balance carried forward improved to £905,445 from £843,970. Meeting, London, June 22.

New Broken Hill's Ore Production Exceeds Target Set

During the year ended December 31, 1954, ore production by New Broken Hill Consolidated (in which the Consolidated Zinc Corporation group has a substantial interest) considerably exceeded the target set for the year. From a total of 483,461 (403,662) tons of ore milled 56,564 (44,031) tons of lead concentrate were produced containing 41,632 (32,459) recoverable tons of lead and 808,406 (645,166) oz. of silver. Output of zinc concentrates rose sharply to 127,180 tons from 100,356 previously in addition to which 1,124 tons of lead-copper concentrate assaying 16.8 per cent Cu., 17.7 per cent lead, 125.5 oz. of silver and 10.2 per cent zinc were recovered.

Ore reserves as at December 31 totalled 2,800,000 tons assaying 11.1 per cent lead, 2.7 oz. of silver, and 11.9 per cent zinc.

At the beginning of the past financial year the company issued at par £1,000,000 5½ per cent unsecured loan stock 1956/65 one half of the issue being convertible into shares at the rate of four shares for each £5 of stock. Reflecting this operation total assets of the company expanded to £8,000,385 from £6,403,574 including cash balances at £1,040,823 (£352,622). A position of liquidity was consequently established, net liquid assets (taking into account future taxation) being £500,000.

Net profits after tax earned during the past financial year rose to £597,274 from £413,262 and after a transfer of £200,000 (£250,000) to general reserve and dividends which absorbed £384,454 (£184,898) undivided profits rose to £270,007 from £257,187

In his statement to shareholders Mr. John R. Govett, the chairman, made the same comments regarding lead and zinc prices as for The Consolidated Zinc Corporation. Meeting, London, June 22.

De Beers Meeting: Diamond Sales Increased

At the meeting of De Beers Consolidated Mines, Major General J. P. De Villiers, deputizing for the chairman, stated that there was no indication that sales of gem and industrial diamonds were falling off. During the first five months of the year, sales of gems amounted to £23,473,000 as compared with £19,970,000 during the previous corresponding period. Sales of industrials rose to £9,055,000 from £6,580,000.

Frontino's Increased Production: Higher Dividend

An increase in tonnage milled together with a rise in the grade of gold and silver recovered was achieved by Frontino Gold Mines during the year ended December 31, 1954. In addition, the development footage accomplished advanced and ore reserves showed a marked improvement.

Year to Dec. 31	*Tons milled*	*Heads Value Gold*	*Silver*	*Lead*	*Dev't ftge.*	*Ore* Reserves*
	(000)	*dwts.*	*dwts.*	%	(000)	(000)
1954	125.8	11.5	22.4	.73	16.8	212.8
1953	116.3	10.1	17.6	.76	15.6	181.1

* Mill tons (" Proved " only). Value 18.6 dwts. per ton (1953—17.5 dwts.).

This higher output was necessary in order to meet the fall in revenue which resulted from a drop in the average rate of exchange realized on the sale of "Gold Mining Dollars" to 2.982 pesos to the U.S. dollar from 3.116 pesos during the preceding year. It will be remembered that the system of "Gold Mining Dollars" was instituted in 1953 when the "Prima" on gold of 30 pesos an ounce was withdrawn. Despite these adverse currency conditions, however, the company was able to increase its total revenue substantially.

Year to Dec. 31	*Total Revenue*	*Expenditure**	*Taxation*	*Dividends*	*Net Profit*	*Carry Forward*
	£	£	£	£	£	£
1954	919,108	813,009	24,602	20,856	22,704	48,152
1953	822,313	718,004	32,557	13,418	DR 2,454	42,039

* In Colombia only.

Dividends on the issued ordinary capital of £190,573 were increased to 12½ per cent from 10 per cent.

During the first four months of the current financial year there has taken place an improvement in the price of mining dollars. This development has been reflected in the total value of production to the end of April which moved up to £302,600 from £288,363 during the previous corresponding period. Lord Rathcavan is chairman. Meeting, London, June 30.

New Consolidated Free State Granted Saaiplaas Lease

It has been announced by New Consolidated Free State Exploration Company that official notification has been received granting a lease of the undermining rights over 3,416.5 morgen situated in the Saaiplaas area of the Orange Free State.

Arrangements are in hand for the registration of a company to be known as Saaiplaas Gold Mining Company with an authorized capital of £6,500,000 divided into 13,000,000 shares of 10s. each. This company will take cession from New Consolidated Free State Exploration of the above mentioned mining lease and mineral rights of the farms included in the mining lease which have been contributed by New Consolidated Free State, Middle Witwatersrand (Western Areas), New Free State Gold Estates, and South African H.E. Proprietary.

The formula for the calculation of annual lease payments by the Saaiplaas Company will be $Y=25—150$ over X where X is the ratio of net profit to recovery expressed as a percentage and Y is the percentage of profit payable to the Government after capital expenditure allowances.

A further announcement regarding an offer of shares by the new company will be made shortly.

East Champ D'or Expects to Pay Dividends During 1955

At the meeting of the East Champ D'Or Gold Mining Company held recently, the chairman stated that by December 31, 1954, the whole of the loans from the Johannesburg Consolidated Investment Company had been repaid. It was, therefore, expected that during 1955 the payment of dividends would be recommenced. The last such payment was made to shareholders registered at June 30, 1953.

Water Inrush at F.S. Geduld

It has been announced that an inrush of water took place last week on the 47th level in the No. 2 shaft area of Free State Geduld Mines. It is anticipated, however, that the measures taken to deal with the position will prove successful but that development work at the shaft will be delayed for a short period.

Great Boulder Maintains Net Profits : Pays More

Operations carried out by The Great Boulder Proprietary Gold Mines, the Australian producer, during the year ended December 31, 1954, resulted in a total of 470,914 dry tons of ore being treated as compared with 460,172 dry tons previously. From this tonnage 107,999 f.oz. of gold together with 73,549 f.oz. of silver were recovered. These figures showed an improvement over the preceding year's totals of 106,668 f.oz. of gold and 56,093 f.oz. of silver. The virtual disappearance of premium revenue from gold sales however, left total earnings slightly below those of the year before.

Year to Dec. 31	*Total Revenue* £A	*Taxation* £A	*Net Profit* £A	*Dividends* £A	*To Reserve* £A	*Carry Forward* £A
1954	1,710,001	23	206,955	156,250	Nil	46,784*
1953	1,746,790	26	206,693	125,000	80,000	50,438

* After £57,592 written off mining leases and expenditure on mine development.

Despite the fact that net profits were no more than maintained dividends on the issued ordinary capital of £250,000 in units of 2s. stg. were raised 50 per cent from the previous total of 40 per cent.

As at December 31, the company's ore reserves were estimated at 2,045,100 tons with an average grade of 5.41 dwt. per ton. Mr. A. M. Coulson is chairman and managing director. Meeting, Melbourne, June 8.

Rio Tinto Increases Dividend : Scrip Issues

An ordinary dividend in respect of the year ended December 31, 1954, of 15 per cent tax free on its issued ordinary capital of £2,125,000 in shares of £5 each has been announced by the Rio Tinto Company. In addition, a 15 per cent tax free bonus is to be paid bringing total distribution in respect of the year up to 30 per cent. This marks an increase of 10 per cent over the preceding year during which a dividend of 15 per cent tax free together with a 5 per cent tax free bonus was paid.

Net profits earned by the company during the past financial year moved up substantially to £990,794 from £614,087. Dividends absorbed £683,203 (£469,688) and the balance carried forward to the consolidated balance sheet rose to £1,522,838 from £1,338,715.

It is proposed to make scrip issues by capitalizing £3,187,500 from reserves of one new 5½ per cent £5 second preference share for every two £5 ordinary together with a one for one issue of ordinary shares. It has been stated that the company do not propose to recommend any cash distribution out of the proceeds of the sale of the Spanish assets. During the past twelve months opportunities have arisen for investment by the Rio Tinto group in certain overseas mining ventures, notably in Canada.

The outstanding feature of the consolidated balance sheet as at December 31 concerned the market value of quoted investments which were virtually double at £21,093,161 from £10,994,306 their previous market value. This, of course, reflected the steep advance in copper shares during the year which represent the major part of the company's portfolio. Unquoted shares also increased in value from £602,030 to £3,890,450. This, however, represented a balance sheet alteration showing the switch from Spanish fixed assets to a stake in the new Spanish company. Lord Bessborough is chairman. Meeting, London, June 30.

Tharsis Sulphur's Increased Profits

A sharp rise in shipments of pyrites during the year ended December 31, 1954, from 606,699 tons to 718,983 tons was primarily responsible for the higher profits earned by the Tharsis Sulphur and Copper Company.

Year to Dec. 31	*Total* Revenue* £	*Taxation* £	*Net Profit* £	*Dividends* £	*To Reserve* £	*Carry Forward* £
1954	777,211	315,971	239,847	89,844	125,000	257,991
1953	598,580	278,145	162,997	85,937	75,000	232,988

* Trading profit £770,156 (1953-£590,964). Investment income £7,055 (1953-£7,616).

Dividends on the issued capital of £1,250,000 in shares of £2 were maintained at 12½ per cent.

In his statement to shareholders, Mr. W. P. Rutherford, stated that the demand for pyrites was generally satisfactory. In Spain, however, where there was marked industrial progress, and to which country the company delivers increasingly large tonnages, the price officially fixed in July, 1950, has remained unchanged. Due to increased costs such sales are now unprofitable.

Messina Brings Umkondo into Production

It has been announced by the Messina (Transvaal) Development Company that its Southern Rhodesian copper property at Umkondo has been brought to production. Development at this mine had been in progress for some twenty-nine months and its arrival at the production stage at the time previously forecast by the chairman has been well received. The mine is expected to produce some 2,000 l.tons of copper a year which will be transported by road to Messina for smelting.

Gopeng's Bright Prospects

Although a greater volume of ground was treated by Gopeng Consolidated, the Malayan tin hydraulicing property, during the year ended December 31, 1954, a drop in the yield of tin concentrates per cu. yd. treated reduced total output to a level below that of the previous year. Total revenue therefore declined.

Year to Sep. 30	*Treated cu. yd.* (000)	*Per cubic yd. Yield* (lb.)	*Per cubic yd. Cost* (d.)	*Output in tons* (conc.)	*Price rec'd per ton* £	*Av. price tin metal* £
1954	2,181.4	0.57	12.60	563.3	419.30	690
1953	1,767.1	0.75	17.04	585.1	485.86	800

On the other hand considerable success was achieved inasmuch as there was a sharp reduction in working costs. Unfortunately, however, this improvement was not able to avert a fall in profits which was the outcome of lower prices received for tin concentrates than those of the previous year.

Year to Sep. 30	*Total Revenue* £	*Taxation* £	*Net* Profit* £	*Dividends* £	*To Reserve* £	*Carry Forward* £
1954	319,819	79,336	134,354	54,418	Nil	53,969
1953	387,627	83,708	163,273	69,755	9,220	53,369

* After £10,193 (1953—£27,793) written off Capital Expenditure.

Dividends on the issued ordinary capital of £395,768 in stock units of 5s. were accordingly reduced to a total of 25 per cent from 32½ per cent.

The outlook for the current financial year is exceptionally bright. During the first six month's operations output has been stepped up to 373¼ tons (126¼ tons up over that of the previous corresponding period). Nor do the general managers, Osborne and Chappel, expect this improvement to fall off during the coming months.

In view of the current firmness in the price of tin, and the likelihood that Gopeng's working costs are still well under control, the year to December 31, 1955, should be most profitable. At all events, the addition of proceeds from the sale of some 150-200 extra tons of tin concentrates should go a long way towards enabling a higher distribution to be made.

Idris Produces More : Earns More : Pays Same

A decrease in the volume of ground treated by Idris Hydraulic Tin during the year ended December 31, 1954, was offset by a sharp upward movement in the grade recovered.

Year to Dec. 31	*Treated cu. yds.* (000)	*Per cubic yd. Yield* (lb.)	*Per cubic yd. Cost†* (d.)	*Output in tons* (conc.)	*Price* rec'd per ton* £	*Av. price tin metal* £
1954	521.8	1.23	30.3	286.9	394.84	718
1953	544.1	0.96	27.8	234.7	400.23	730

* Less tribute, duty and smelter's charges.
† Excluding security expenditure.

Although the price received for tin concentrates showed no great difference from that of the previous year, costs unfortunately rose. This prevented the added profitability which would otherwise have taken place.

Year to Dec. 31	*Total Revenue* £	*Taxation* £	*Net Profit* £	*Dividends* £	*To Reserve* £	*Carry Forward* £
1954	119,530	23,907	21,275	8,250	Nil	20,916
1953	101,390	13,187	15,248	8,250	1,238	7,891*

* After £5,003 written off property account.

Dividends on the issued ordinary capital of £120,000 in 5s. shares were maintained at the previous year's level of 12½ per cent.

Output in respect of the first four months of the current financial year has been virtually unchanged at 75½ tons as against 74 tons during the previous corresponding period. It is expected that the company's average rate of output should be maintained during the coming months.

Mr. A. G. Glenister is chairman. Meeting, London, June 8.

Siamese Tin Maintains Net Profit

A considerably lower liability for taxation incurred by Siamese Tin Syndicate during the year ended December 31, 1954, offset the drop in total profit earned and resulted in net profits after taxation remaining largely unchanged from those of the previous year. The following figures have been taken from the company's preliminary profit statement and are subject to audit.

Year to Dec. 31	*Total Profits*	*Taxation*	*Net Profit*	*Dividend*	*To Reserve*	*Carry* Forward*
	£	£	£	£	£	£
1954	265,731	127,894	137,837	92,888	Nil	62,937
1953	343,963	209,141	134,822	88,242	5,833	64,539

* After additional provision for dredge upkeep in respect of previous years £20,000 (1953-£15,357) and sundry provision together with amounts written off of £26,551 (1953-£12,708)

With the recommendation of a final dividend of 20 per cent on the issued ordinary capital of £546,400 total distribution for the year amounted to 30 per cent.

Figures from the preliminary balance sheet showed fixed assets down at £507,275 from £608,609. Current assets, less current liabilities including future tax, also declined to £941,619 from £981,430. It was stated that the fall in value of consolidated fixed assets was due to normal depreciation and amortization together with the writing down of the Lowland Lead Mines development account to £40,000.

Mr. R. S. G. Scott is chairman. Meeting, London, June 23.

Company Shorts

Halkyn's Increased Zinc Production.—Although tonnage crushed by Halkyn District United Mines during the year ended December 31, 1954, declined slightly to 30,490 tons of ore, as compared with 30,574 tons previously, output of lead concentrates rose to 2,730 tons from 2,676 tons while zinc production made the very considerable advance of 342 tons to 798 tons as against only 456 tons during the preceding period. The advantage derived from slightly higher prices for both lead and zinc was, however, to some extent offset by increased production costs which resulted from greater expenditure in respect of wages and cost of supplies. Nevertheless, the net profit earned rose to £50,199 from £42,697 and after amounts written off of £13,705 (£22,857) together with taxation of £4,952 (£9,245) the dividend of 25 per cent on the issued ordinary capital of £82,270 on 2s. stock units marked a rise from 20.8 per cent for the previous year. This payment absorbed £11,826 (£9,427) and the balance carried forward advanced to £42,952 from £23,237. Mr. R. W. Bankes is chairman. Meeting, Chester, June 14.

Mason and Barry's Increased Profits.—Profits before tax of £57,439 (£42,000) earned by Mason and Barry, the Portuguese pyrites and copper property, during the year ended December 31, 1954, rose to £94,376 from £41,299. Dividends and cash bonus absorbed £21,295 (£15,277). The carry forward was increased to £55,532 from £44,490.

Marsman Again Makes Loss.—After expenses and all charges a loss of £27,517 (£198,377) was made by Marsman Investments during the year ended April 30, 1954. The adverse balance carried forward was increased to £355,786 from £328,269.

Oceana Development's Sharp Rise in Profits.—Net profits after tax earned by The Oceana Development Company during the year ended December 31, 1954, rose to £12,196 from £4,536 previously. Dividends amounting to 12½ per cent were paid on the issued ordinary capital of £131,821 in stock units of 5s. This compared with 10 per cent in the preceding year. The balance carried forward rose to £14,907 from £10,122. Mr. R. C. Bromhead is chairman. Meeting, London, June 7.

British-Borneo Petroleum Maintains Profits.—British-Borneo Petroleum Syndicate's profits for the year ended March 31, 1955, at £292,843 remained largely unchanged from the previous year's total of £284,944. A dividend of 1s. 4d. free of income tax has been recommended on the issued ordinary capital of 349,998 in stock units of 6s. This compared with 1s. 3d. in the preceding year on a capital of £300,000. After taxation of £158,000 (£171,000), transfers to reserve of £55,000 (£45,000), unappropriated profits carried forward were £50,161 (£48,095). Meeting, June 8.

BRITISH GUIANA CONSOLIDATED GOLDFIELDS

INCREASED OPERATING PROFIT

The nineteenth annual general meeting of British Guiana Consildated Goldfields Ltd. was held on June 6, 1955 in London.

Sir Roland Robinson (the chairman), in the course of his speech, said :—

Our operating profit for 1954 has increased, compared with last year, by no less than £57,000, and it is of interest to note that this is also the amount by which the proceeds of bullion dredged exceeds the previous year. This means in turn of course that our General Manager, Mr. Park, has been able, despite the many difficulties met with during the year, to keep the expenses in British Guiana at approximately the same level as the previous year.

During 1954 the actual yardage dredged by our two dredges was very little greater than for 1953, but the ground worked proved richer producing 4.3 grains fine per cubic yard, compared with 3.32 grains fine the previous year.

The Waddington dredge which was during 1954 operating on what might be described as the remnants of our Mahdia concession in the Upper Mahdia, only contributed 11% of the total production for the year, and throughout the year was dredging on comparatively low grade ground with resultant poor yield.

The ground worked by the Potaro dredge proved able to produce 4.9 grains per cubic yard.

The net price realized per fine ounce was 3d. lower than last year. About 11% of our production was sold in the U.K. on the free market, 60% in the U.S.A. at gold prices fixed by the U.S.A. Mint, and the balance in British Guiana. During 1954 the premium on gold in the free market remained very small indeed, and we have not therefore been able to obtain very much benefit from that source. We are always on the look out to take advantage of any premium on gold which may exist.

The taxation arising out of the profits earned for 1954 will, it is estimated, amount to £27,500. The net profit for the year is therefore £12,203, and from this amount your Directors have decided to recommend that a dividend of 5% less tax at 8s. 6d. in the £ should be paid. This will absorb £8,470, with the result that £3,733 will be retained in the business out of the year's profits, and added to the carry forward, which also includes the welcome amount of £2,500 being tax provision in earlier years no longer required, and will therefore total £18,480, a substantial figure with which to face the difficulties of 1955.

This year we have a new item in the Balance Sheet—the shares we hold in our Subsidiary company, the Potaro Hydro-Electric Co. Ltd., which was incorporated in British Guiana in June 1954. Our investment at the moment is limited to £16,000 but eventually it will amount to £55,000, and when the hydro-electric installation is complete, we will sell to that company as stand-by plant, our three Atlas Polar diesel engines which are at present providing power for the Potaro operations.

Under our arrangement with the Colonial Development Corporation, the Corporation will take up shares to the value of £45,000 in this company, the eventual share interest being 55% your company and 45% the Corporation. In addition, the Corporation has agreed to finance the hydro-electric scheme by loan on debenture totalling £240,000 at 5½% interest.

We should explain that this is a British Guiana company, managed in the Colony and will I hope be the forerunner of many further hydro-electric schemes, in which we hope the British Guiana Government will participate.

Despite exceptionally abnormal rains during the past two so-called dry seasons, we have every reason to hope that the hydro-electric power will be available by the end of 1955, when we hope that the Konawaruk dredge also will be ready to commence operations.

We will thus again be back to two-dredge operations, for we have closed down the Waddington dredge at the end of April this year. The Mahdia area is now almost worked out and for some time the Waddington dredge has not been able to operate at a profit.

THE CURRENT YEAR

With regard to the current year, inclusive figures for both dredges for the four months to April 30 are as follows :—Yardage dredged 680,253; fine ounces recovered 6,475. As I have mentioned the Waddington dredge ceased operations from the end of April last, therefore for 1955 we will depend wholly on the production from the Potaro dredge.

Application for an exclusive permission to explore for Columbite in a selected area of the interior of the Colony has been granted.

IDRIS HYDRAULIC TIN LTD.

LARGER OUTPUT

MR. A. G. GLENISTER'S STATEMENT

The forty-first annual general meeting of Idris Hydraulic Tin Ltd., was held on June 8 at the Offices, 73 Cheapside, London, E.C.

Mr. A. G. Glenister, Chairman of the Company, presided.

The following is an extract from the statement by the chairman which was circulated to shareholders. It is satisfactory to note that, although the total yardage treated was slightly less than that of the previous year, the Company's total output was 287 tons compared with last year's figure of 235 tons. The average cash price for tin metal during 1954 was £718 per ton as compared with £730 for 1953.

The profit for the year, after charging £23,907 for taxation, is £21,275, to which has been added the balance brought forward from last year, £7,891, making a total credit of £29,166. Dividends totalling 7½d. per share (less income tax) have been paid in respect of the year under review, absorbing £8,250, and the Directors recommend, for the reason given in their report, that the remaining balance of £20,916 be carried forward to the current year. Taxation (including tin duty) absorbed 68.6 per cent. of the profit for the year.

DEVELOPMENT

Development at the Batu Karang section was continued by the removal of further overburden and low-grade ground. In March, sinking operations were commenced in the paddock floor and improved outputs were later obtained from the lower levels. The average grade of the ground treated was higher than in the previous year, but the yardage was less owing to a smaller average water supply.

The Mining Lease over the road and road reserve, referred to in the General Managers' Report, will, if approved, add materially to the workable area at this section which already has substantial ore reserves.

At the Kranji section, extensive stripping of tailings was carried out in order to release additional ground for mining. The deposit at this section is a complex one which does not lend itself to a straightforward estimate of ore reserves, as boring alone tends to give misleading results. Such deposits normally contain irregular leads and pockets of varying value, the extent of which experience at this section and elsewhere has shown can be determined only as working proceeds. In addition, the working paddock at the Kranji section is very deep and lies between the main railway line and the main trunk road of the peninsula, with other active mining operations adjoining. Tailings disposal is, therefore, also a difficulty and might limit the scope of mining operations at this section.

The General Managers, however, estimate that, at the present rate of working, there is at present some eight years of recoverable payable ground in sight at this section, subject of course, to a reasonable price for tin. For the reasons given above, this figure can only be approximate either way.

THE OUTLOOK

The proposed International Tin Agreement, to which I referred in my address last year, subsequently received the necessary number of signatures of producing and consuming countries, but the required minimum number of ratifications has yet to be obtained. The future is therefore uncertain and I can only say that, apart from any interference which the institution of International Control may impose upon the Company, the General Managers anticipate that the average rate of output should be maintained during the current year. The total output for the four months of this year is 75¼ tons as against 74 tons for the corresponding period last year.

The report and accounts were adopted.

The meeting concluded with a cordial vote of thanks to the General Managers, Messrs. Osborne and Chappel and the staff at the mine.

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GOPENG CONSOLIDATED LTD.

MR. DONALD W. THOMAS'S REVIEW

The Forty-second Ordinary General Meeting of Gopeng Consolidated, Limited, was held on June 6, 1955, at the Registered Office, Redruth.

Mr. Donald W. Thomas (Chairman) presided.

The Report and Accounts for the year ended September 30, 1954, having been circulated for the prescribed time, were taken as read, as was also the Chairman's Statement, circulated with the Accounts, which was as follows:—

The Accounts for the financial year ended September 30, 1954, show a profit of £65,211, after payment to the Malayan Government of £43,771 for royalty on ore sales and provision of £79,336 for United Kingdom and Malayan taxation.

Five dividends, each of 1s. per £1 Stock, paid in respect of the year under review absorbed £54,418, and the sum of £10,193 has been written off Capital Expenditure. After provisions for these commitments, the balance unappropriated at September 30, 1954, was £53,969, an increase of £600 over the corresponding figure of the previous year.

The average price of tin during the period under review was £690 per ton (metal) which compares with £800 per ton (metal) in the previous year.

The attention of Stockholders is drawn to the report of our General Managers, Messrs. Osborne and Chappel, circulated with the Report and Accounts, where the comparative figures of ground treated, tin-ore recovered, etc., are clearly set out. The volume of ground treated was over 400,000 cubic yards more than during the previous year, but the tonnage of tin-ore recovered was slightly less. It is pleasing to note that the working costs were reduced from 17.04 pence per cubic yard for 1952/53 to 12.60 pence per cubic yard for 1953/54.

Both the Sanglop and Moynalpy Rubber Estates again showed losses, but a refund of Replanting Cess of £3,630 off-set these losses and left a credit of £1,053.

I am glad to be able to report that the security position has improved, although the precautions which are still necessary entail continued strain on those responsible for the management of our property.

It is pleasing to place on record in these Annual Statements our appreciation of the services of our General Managers, the Resident Manager, and the staff at the mine and the estates. The manner in which the deviation of the Kampar Water Supply Line, to which I drew attention last year, was accomplished—with the minimum interruption in the winning of tin-ore—reflects great credit on all concerned in this major engineering achievement.

Stockholders have been advised as follows of the production of tin-ore during the first six months of the current financial year:—

October/December	1954	... 2,996 piculs	= 178¼ tons
January/March	1955	... 3,275 piculs	= 195 tons

Stockholders will be interested to know that the International Tin Agreement has received the required number of Member Governments' signatures, but it still requires ratification by some of the Governments concerned before it can be brought into operation.

I am not prepared to venture an opinion as to what the result will be, or its effect on the mine, but, under present conditions, it is reported by the General Managers that the present improved rate of output should be maintained during the current year.

In conclusion, I am happy to advise Stockholders that extensive boring operations completed during this year have confirmed scout bores in a large volume of the Company's reserve mining land carrying medium values at Moynalpy section of the property.

The Statement of Accounts and Balance Sheet, together with the Directors' Report, were received and adopted.

JOINT I.M.M. AND I.M.E. LIBRARY SERVICES TO BE SUSPENDED

To enable the final stages to be completed of the division and removal of the joint library of the Institution of Mining and Metallurgy and the Institution of Mining Engineers, it is regretted that it will be necessary to suspend all library services from Friday, July 1, 1955. It is expected that by the end of September both Institutions will be in occupation of their new premises; The Institution of Mining and Metallurgy at 44 Portland Place, London, W.1, and The Institution of Mining Engineers at 3 Grosvenor Crescent, London, S.W.1.

CENTRAL PROVINCES MANGANESE ORE

GOOD DEMAND AT LOWER PRICES

KEEN INTEREST IN LABOUR WELFARE

MR. H. R. HOLMES ON THE YEAR'S OPERATIONS

The Forty-seventh Annual General Meeting of The Central Provinces Manganese Ore Co., Ltd., was held on June 8 at Winchester House, Old Broad Street, London, E.C.

Mr. A. Linton, M.C., director and secretary, read the notice convening the meeting and the report of the auditors.

The Chairman said :—

Ladies and Gentlemen,—The report and accounts for the year ended December 31, 1954, have been in your hands for some time, and I propose, with your permission, to take them as read. (Agreed.)

Before asking for your approval of the accounts I would like to make a few comments on the figures which appear in the balance-sheet and profit and loss account, as well as some remarks on the conditions ruling in the manganese ore business during the period under review.

From the profit and loss account you will see that the balance on trading was £2,234,297, as compared with £3,011,226 for 1953 after excluding the exceptional item of £270,376 arising that year from the increased value of lower grade stocks. For some time prior to 1954 there was a very heavy demand for manganese ore from all consuming countries, and prices rose to unprecedented levels. During 1954, however, the trend was reversed; buyers in some countries found that they had accumulated large stocks, demand for ore fell off seriously and prices consequently were affected. Owing to the good relations that we have built up over a long period with the principal consumers of manganese ore in the world, we did not suffer as much as might otherwise have been the case. Nevertheless, we had to accept lower prices in the second half of the year, and this, in addition to railing difficulties which prevented us from fully implementing our contracts, resulted in our profits being considerably reduced.

PROSPECTS FOR CURRENT YEAR

As mentioned in the directors' report, there is at present a good demand for our ore, but at prices lower than those obtainable in 1952 and 1953, when market conditions were exceptionally advantageous. Another factor which has to be taken into account, when one considers the future, is the opening up of other manganese areas in various parts of the world, which will no doubt complete in course of time with ore supplies from existing sources. But on the other hand it has to be borne in mind that the steel production in the world is continually expanding. So far as I can see at the moment, and providing that nothing unforeseen arises, I think that the prospects for the current year's trading are not unsatisfactory.

Of the balance on trading account taxation takes £1,265,000, and of this Indian taxes amount to £1,259,000. In addition we paid considerable sums in India on account of royalty and of export duty. Furthermore, we give employment to many thousands of Indians, whose wages and bonuses, and the many amenities provided for them, amount to a very large sum annually. As you are probably aware, the export duty was abolished last August.

On the debit side of the profit and loss account, depreciation of fixed assets at £97,251 is much higher than the previous year's figure of £69,537. This is owing to the substantial expenditure we have made in recent years on plant, machinery, and buildings, on which we have to provide for depreciation. I think it probable that the expenditure under these heads will continue for some years yet, because as the mines get deeper with the attendant technical problems, it is essential to spend money on equipment, particularly in those cases where it is necessary to change the method of working from opencast to underground mining.

The net profit for the year, after providing for taxation and depreciation is £899,284 as against £1,057,651 for the previous year, and out of this your directors recommend that the sum of £150,000 be transferred to the general reserve which will increase it to £350,000.

PROPOSED APPROPRIATIONS

Your directors also recommend that the following appropriations should be made :—

To staff benefit fund, £30,000; to workers welfare fund, £20,000; to contingencies reserve, £75,000.

With regard to the staff benefit fund, as I have said on previous occasions, it is essential that this fund be built up in order to provide something for our staff when the time comes for them to retire. As you no doubt well know, with taxation both in India and the United Kingdom at its present level, it is difficult for anyone to save sufficiently for retirement, and I feel sure that this allocation will have your approval.

As regards the workers' welfare fund, you are probably aware that the Government of India attach very high importance to the welfare of all workpeople employed in industry. You will see from the balance-sheet we spent £17,117 during the year on this welfare work, and the £20,000 which we propose to appropriate to this fund is to replace this expenditure. We have always taken the keenest interest in the welfare of our labour and have in the past done much to improve the conditions under which they work and live. We hope that, with the co-operation of the Government and the trade union, labour relations will remain on the same satisfactory footing as they have been in past years.

An interim dividend of 1s. 2d. per unit free of tax was paid (on the capital as increased last year) on October 1 last, and your directors now recommend that a final dividend of 1s. 8d. per unit, plus a bonus of 1s. 4d. per unit, both free of tax, should be paid, altogether absorbing £625,000. This will leave £228,790 to be carried forward, as compared with £232,294 brought in.

BALANCE-SHEET FEATURES

Turning to the balance-sheet, you will notice on the assets side that the value of the manganese ore stocks has risen from £659,547 to £835,681. This increase is due principally to the fact that we were unable to ship all the ore required to implement our contracts in full, owing to the railing difficulties in the first six months, and to scarcity of sea space towards the end of the year.

British and Indian Government securities were £1,319,117 as compared with £1,570,953, while cash at bank and in hand was £303,063 against £1,280,337 the reduction being due to payment of income tax and the financing of additional ore stocks.

On the liabilities side of the balance-sheet, the issued capital is £1,500,000 as compared with £1,000,000 in the previous accounts, the difference of course being the £500,000 capitalized from reserve last year.

VISITS ABROAD

In June of last year two of your directors, Mr. Hardy and myself, visited the United States of America to keep in touch with our very important customers there and to discuss with them several business matters. They are the largest producers of ferro-manganese in the world, and I am glad to say that we have had very cordial relations with them for many years now. I would not like this opportunity to pass without expressing our appreciation of their understanding of our problems.

In January of this year Mr. Hardy also visited the mines in India, and submitted very full and informative reports to the board. There is no doubt that these periodic visits to the mines by members of the board are of the utmost value to the company. He also took the opportunity of calling on certain Central Government officials in Delhi and also State Government Ministers and officials in Nagpur. I am glad to say that our relations with these different authorities continue on a satisfactory basis.

Last year I referred to the heavy media separation plant at our Dongri Buzurg Mine which was installed to extract ore from the old dumps at that mine. I am sorry to say that we have had considerable teething troubles with this plant, and it has also been affected by shortage of water. I hope that these difficulties will shortly be overcome and that I shall be able to give you a satisfactory report on it at our next meeting.

Our diamond drilling programme is proceeding. The plant is now drilling at Dongri Buzurg Mine and the bed has been proved to a depth of 485 ft. below plain level. At this depth one of the holes has proved the bed to have a true thickness of 110 ft.

TRIBUTE TO MANAGEMENT AND STAFF

I wish to pay tribute to the management and staff for their able and untiring efforts on the company's behalf during what has been a difficult and arduous year, and also to the work of

our shipping agents in India, Messrs. James Finlay and Co. Ltd., who have been most efficient and helpful. I am sure that they will appreciate the thanks of the stockholders which, with your approval, I propose to convey to them.

I now beg to move : "That the report of the directors and statement of accounts as at December 31, 1954, be and are hereby approved and adopted, and that the profits be appropriated as recommended by the directors." I will ask Major Herring to second the motion, and before putting it to the meeting I shall be glad to deal with any questions which stockholders may wish to ask.

Major A. C. Herring, V.C., A.C.A., seconded the motion, and it was carried unanimously.

The board's proposal of a final dividend of 1s. 8d. per unit, free of tax, and a bonus of 1s. 4d. per unit, free of tax, was also approved.

The retiring director, Major A. C. Herring, V.C., A.C.A., was re-elected and, the remuneration of the auditors, Messrs. W. A. Browne and Co., having been fixed, the proceedings terminated with a vote of thanks to the chairman, directors and staff, both at home and abroad.

Mining Men and Matters

Mr. Andrew Fletcher, president of the St. Joseph Lead Co. of New York, has been elected president of the Lead Industries Association in succession to **Mr. J. B. Haffner,** former president of the Bunker Hill and Sullivan Mining and Concentrating Co., of Kellogg, Idaho.

Mr. J. S. Hutchison has been appointed chairman of Metal Industries Ltd. in succession to **Mr. McCrone,** who has retired but will retain his association with the company through his appointment as one of the company's honorary presidents. **Sir Charles Westlake,** at present chairman Uganda Electricity Board, has been appointed to the board as have **Mr. J. O. Knowles,** chairman and joint managing director of Brookhirst Switchgear Ltd., and **Mr. J. T. Rymer,** managing director of Sentinel (Shrewsbury) Ltd.

Mr. J. A. Perham has been appointed sales director of the Atlas Diesel Organization. **Mr. Eric Ryd** has been appointed technical director and **Mr. J. C. Greig** has been appointed managing director of Atlas Diesel Ltd. in Britain.

Mr. D. A. Thompson, O.B.E. (chairman) and **Mr. S. H. Boileau** (honorary chairman) have resigned from the boards of The African Manganese Company, The African Chrome Mines, Baluchistan Chrome Company, The Chrome Company, Minerals Research Syndicate, and Rhodesia Chrome Mines. **Mr. D. A. Thompson** has also resigned from the board of The African Manganese Company (Mines Management). **Mr. Reginald Coward** has been appointed chairman and managing director of the above mentioned companies. **Mr. Douglas Bantick** has been appointed a director and general manager of the aforementioned companies and **Mr. Norman C. White** has been elected to their respective boards.

Rhodesian Selection Trust Board Changes : Mr. R. M. Peterson resigns on June 30, 1955, his appointment as director and technical director of Ndola Copper Refineries and Rhodesian Selection Trust (Services) and his appointment as technical vice-president of Roan Antelope Copper Mines, Mufulira Copper Mines, Rhodesian Selection Trust and Chibuluma Mines.

Mr. A. B. MacLaren joins the boards of Roan Antelope Copper Mines, Rhodesian Selection Trust, Chibuluma Mines, Chisangwa Mines, Kadola Mines, Luapula Mines, Mwuinilunga Mines, Ndola Copper Refineries and Rhodesian Selection Trust (Services) on July 1, 1955. He also becomes technical vice-present of the Roan Antelope, Mufulira, Rhodesian Selection Trust and Chibuluma Companies, and technical director of Ndola Copper Refineries, Rhodesian Selection Trust (Services) and Choma Mines on the same date.

Mr. C. Kirkpatrick joins the boards of the Roan Antelope, Rhodesian Selection Trust and R.S.T. Group Trustees Companies on July 1, 1955.

Cancellation of I.M.E. Summer Meeting.—The summer meeting of the Institution of Mining Engineers, which was to have taken place in Edinburgh next week, has been cancelled owing to the continuation of the railway strike.

The Zinc Development Association : Change of address. The offices of the Z.D.A. and its affiliates, the Hot Dip Galvanizers, the Zinc Alloy Die Casters, and the Zinc Pigment Development Associations, have now been transferred from Oxford to 34 Berkeley Square, London, W.1. Telephone : Grosvenor 6636 (4 lines).

TRIEFUS & COMPANY

EXPANSION HOME AND OVERSEAS

The eighth annual general meeting of Triefus and Company Limited was held on June 9 in London, **Mr. Albert Triefus** (Chairman and Managing Director) presiding.

The following are extracts from his circulated statement :—

The Consolidated Net Profit amounts to £61,688 as against £49,573 for 1953. Group Reserves stand at £172,644 compared with £167,446 last year.

The Directors recommend a total dividend on the Preferred Ordinary Shares at the rate of 20% per annum and a dividend on the Ordinary Shares at the rate of 7½% per annum.

Dividends from Overseas Subsidiaries showed an increase compared with 1953.

In the Rough Diamond Market, renewed interest towards the end of the year became apparent in North America through the resumption of stockpile purchases and increased world-wide demand by industrial users.

Industrial diamonds are now required in increasing quantities and in January this year a new subsidiary, Triefus Industries Ltd., began trading in the new factory and laboratories at Crawley, Sussex.

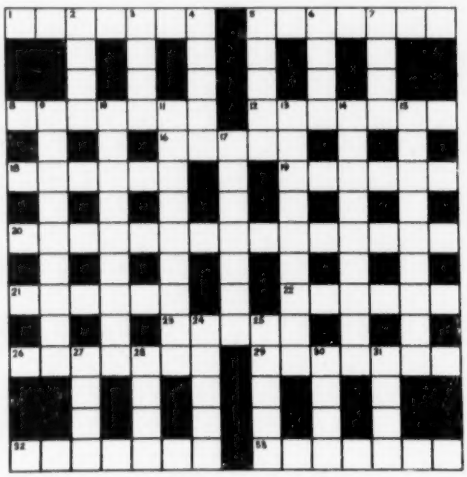
The Company has continued its work as government valuers; grading, valuing and preparing for the market, diamonds received from the Gold Coast. They also acted as valuers to Tanganyika jointly with Mt. Cauzyn.

The sale of polished diamonds through our subsidiaries in Australia and New Zealand has again shown good results.

The Canadian Company was successful in expanding sales of industrial diamonds in the important markets of Canada and the U.S.A.

The French Company was formed in January, 1954, but a full year's trading was not completed.

The report was adopted.



'UNICONE' CROSSWORD No. 6

ACROSS.—1. 26 was a famous one that fought with 53 (7). 5. i.e. a punt (7). 8. An advance of cash (7). 12. Sink and skedaddle (7). 16. Rates as a favourite in the flower border (5). 18. Saving is not for me ! (1, 5). 19. Knights of old were (6). 20. The old lady is an oil painting (9, 6). 21. Bury (6). 22. Tu-whit, to-whoo (6). 23. Could be a star (5). 26. See 1. 29. Yon Dane to kill pain (7). 32. Pieces of wood to feed on (7). 33. As Ag. (7). 11. Could it be a horseman's boot (9). 13. Cornucopia at the tea table ? (9). 14. Choked (9). 15. What the guest outstaying his welcome does (7, 2). 17. Or, in an English river, a flood (7). 24. Lodgings for crooks and monks (5). 25. " Full of strange ——— " (Shakespeare) (5). 27. Aperture (4). 28. A bad type loses his head and goes to church (4). 30. A place for ducks ? (4). 31. A burdensome instrument (4).

DOWN.—2. But only what you sow (4). 3. No optimism without it (4). 4. Associated with lamps and stamps (5). 5. It has reason but no rhyme (5). 6. Heavenly with bread and wine (4). 7. Feather bed perhaps (4). 9. Bad Luck (9). 10. Juice leakage ? This will find it (9).

Solution on page 670

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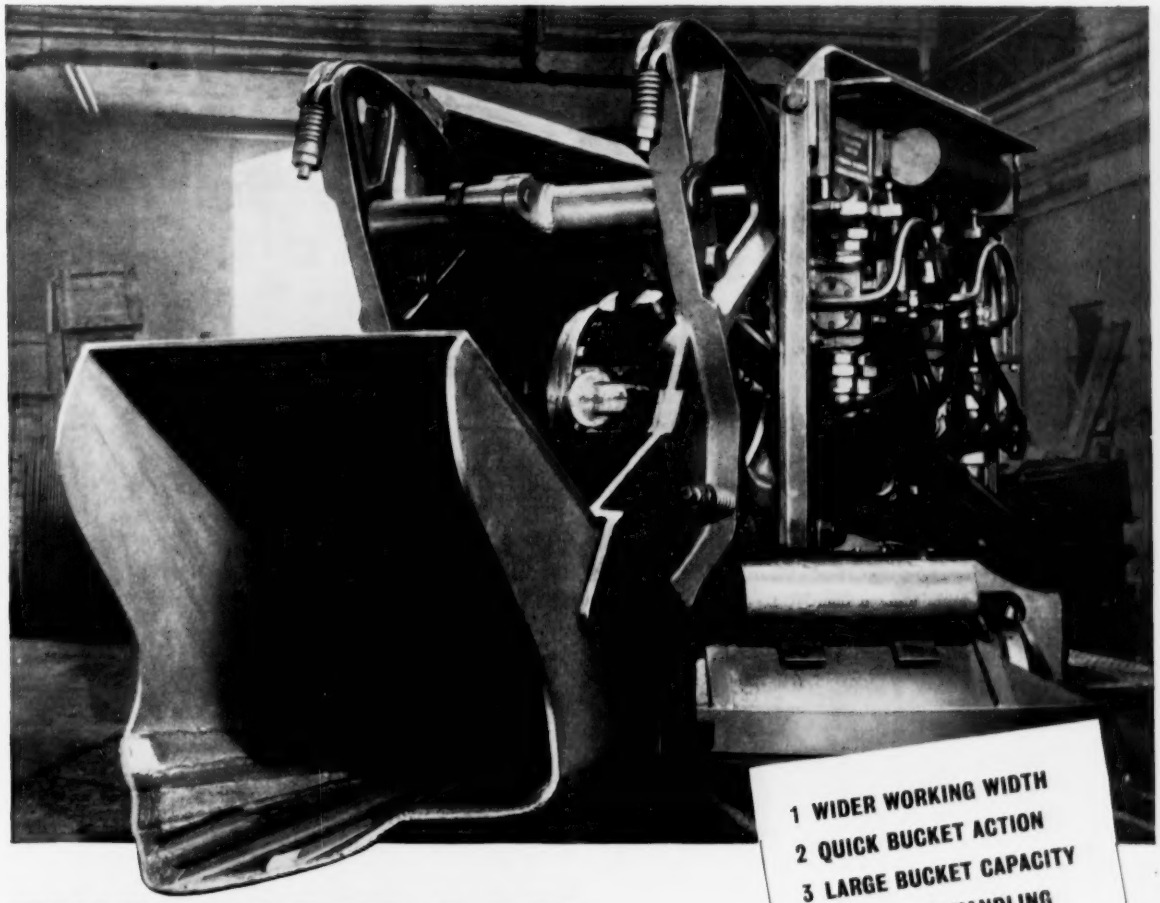

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THE ATLAS COPCO GROUP OF COMPANIES

DIVIDENDS

Ampat Tin Dredging 27½% (June 18)
Australia and New Zealand Bank 4% (July 8)
Consolidated Zinc Corporation 12½% (July 1)
H. E. Proprietary 10% (July 1)
Imperial Chemical Industries 6% (June 30)
International Nickel Co. of Canada 55 c. (June 20)
Kent (F.M.S.) Tin 15%i (June 11)
London Tin Corporation 28% *i* (June 16)
Mount Isa Mines 10% *i* (June 29)
Mufulira Copper Mines 6s. *i* (July 5)
New Broken Hill Consolidated 35% (July 1)
New Jagersfontein Mining 2½% (July 28)
Rhodesia Copper Refineries 5% Red. Cum. Pref. 5% (June 30)
Rhokana Corporation 5½% Red. Cum. Pref. 5½% (June 30)
Rhodesian Selection Trust 1s. 6d. *i* (July 5)
Rio Tinto 30% (July 4)
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CORRECT SOLUTION TO "UNICONE" CROSSWORD No. 6 APPEARING ON PAGE 668

ACROSS: 1, Warship; 5, Petunia; 8, Imprest; 12, Scuttle; 16, Aster; 18, I Spend; 19, Errant; 20, Whistlers Mother; 21, Entomb; 22, Owlish; 23, Actor; 26, Revenge; 26, Anodyne; 32, Battens; 33, Silvery.

DOWN: 2, Reap; 3, Hope; 4, Posts; 5, Prose; 6, Thou; 7, Nest; 9, Mischance; 10, Rheoscope; 11, Saddlebag; 13, Creamhorn; 14, Throttled; 15, Lingers On; 17, Torrent; 24, Cells; 25, Oaths; 27, Vent; 28, Nave; 30, Oval; 31, Yoke.

Vacancies exist in the COLONIAL OFFICE SCIENTIFIC DEPARTMENTS as follows:—

I. DIRECTORATE OF COLONIAL GEOLOGICAL SURVEYS. (a) Ref. G.180/5A. PRINCIPAL SCIENTIFIC OFFICER (Male) required in Photogeological section, Tolworth, Surrey, for the interpretation of vertical air photographs and construction from them of geological maps. Qualifications: Good honours degree in Geology with experience in photogeology and considerable experience of geological mapping, preferably in Colonial territories or under similar conditions, essential. (b) Ref. A.174/5A PRINCIPAL SCIENTIFIC OFFICER (Male) Geophysicist, and (c) Ref. G.181/5A SENIOR SCIENTIFIC OFFICER (Male) Geophysicist required for London Headquarters, S.W.7, and also frequent visits to Colonial territories on field surveys. Qualifications: Good honours degree in Geology or Physics with, for (b) several years' practical experience of seismic and gravitational prospecting and general knowledge of methods of geophysical prospecting; for (c) post graduate study in geophysics and good field experience of geophysical prospecting.

II. MINERAL RESOURCES DIVISION, COLONIAL GEOLOGICAL SURVEYS, London, S.W.7, working on promoting the development of the mineral resources of Colonial territories. GEOLOGISTS required for the study of economic minerals, the digestion of information and preparation of mineral monographs and of reports upon samples submitted for examination. (a) Ref. G.182/5A SCIENTIFIC OFFICERS. Qualifications: Good honours degree in geology and sound knowledge of mineralogy or mining geology. An interest in the economic aspects of the science an advantage. (b) Ref. G.182/5A SENIOR SCIENTIFIC OFFICERS. Qualifications as for S.O. above, but an additional five years' practical experience in the field or in the laboratory necessary. (c) Ref. G.183/5A EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS. Qualifications: Higher School Certificate with science subject as principal subject or equivalent qualification; or General Certificate of Education in five subjects with two scientific subjects at advanced level. Preference given to University degree with geology as principal subject. Also Ref. F.379/5A CHEMIST, for general analysis and examination of minerals and mineral products, rocks, fuels, etc., and the development of methods of analysis. Qualifications: Good honours degree in chemistry or equivalent with inorganic bias. Interest in and sound knowledge of mineral analysis. Experience of spectrographic analysis an advantage.

III. COLONIAL PRODUCTS LABORATORY, London, S.W.7, working on oils and oilseeds, waxes, foods, essential oils, gums and resins, tobacco, drugs, insecticides, paper-making materials, fibres, silks, hides and skins, tanning materials, dried and canned fruit, requires (a) Ref. F.378/5A SENIOR SCIENTIFIC OFFICER OR SCIENTIFIC OFFICER for laboratory investigations and intelligence work in connection with products named above. Qualifications: Good honours degree in chemistry or equivalent qualifications. Experience with products named an advantage. (b) Ref. F.380/5A ASSISTANT EXPERIMENTAL OR EXPERIMENTAL OFFICERS (Two) to assist in laboratory investigations on products concerned. Qualifications: Higher School Certificate with science subject as principal subject: or General Certificate of Education in five subjects with two scientific subjects at advanced level or equivalent qualification. Preference given to University degree in Chemistry, or general degree with Chemistry as one of the subjects. Experience in investigation of any of the products named an advantage.

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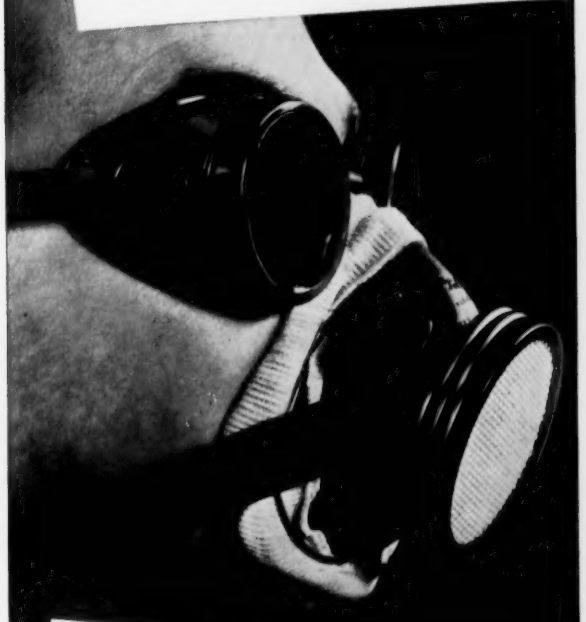

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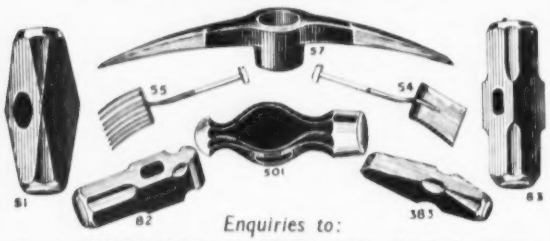

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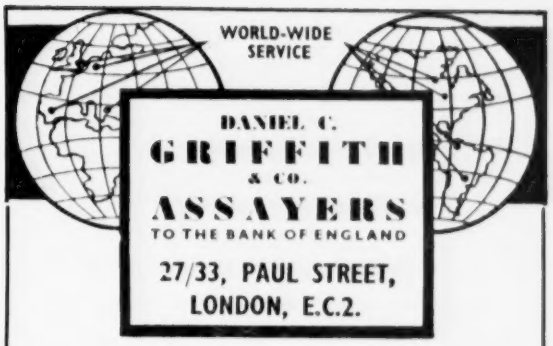

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Wood (Hugh) & Co. Ltd.

ELECTRICAL PRECIPITATION
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EXCAVATORS
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Olding (Jack) & Co. Ltd.
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Ransomes & Rapier Ltd.
Ruston Bucyrus Ltd.

EXPLOSIVES — BLASTING
I.C.I. (Nobel Division)

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FILTERS
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FILTERS — LUBRICATING OILS
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Tecalemit Ltd.

FILTERS — SWITCH & TRANSFORMER OIL
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FIRE EXTINGUISHERS
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Pyrene Co. Ltd.

FIRST AID EQUIPMENT
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FLEXIBLE JOINTS
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FLOTATION EQUIPMENT
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Fraser & Chalmers Eng'g Wks.
Huntington, Heberlein & Co. Ltd.
Knapp & Bates Ltd.

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FOUNDATIONS
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FURNACES
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GEOPHYSICAL INSTRUMENTS
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GEOPHYSICAL & GEOLOGICAL SURVEYS
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Holman Bros. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

HELMETS
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HOISTS
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Fraser & Chalmers Eng'g Wks.
Holman Bros. Ltd.

HOSE — RUBBER
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Dunlop Rubber Co. Ltd.

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English Electric Co. Ltd.
General Electric Co. Ltd.
Igranic Electric Co. Ltd.
Metropolitan-Vickers Electrical Co.
Victor Products (Wallsend) Ltd.

LOCOMOTIVES — DIESEL
North British Locomotive Co. Ltd.
Ruston & Hornsby Ltd.
Wood (Hugh) & Co. Ltd.

LOCOMOTIVES — ELECTRIC
British Thomson-Houston Co. Ltd.
English Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

LOCOMOTIVES — STEAM
North British Locomotive Co. Ltd.

LUBRICATION — MECHANICAL
Tecalemit Ltd.

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Davies Magnetic Works Ltd.
Huntington, Heberlein & Co. Ltd.
Rapid Magnetic Machines Ltd.

MAGNETS-ELECTRO LIFTING
Igranic Electric Co. Ltd.
Rapid Magnetic Machines Ltd.

MINE CAR — WHEELS & AXLES
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Ward (Thos. W.) Ltd.

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Fraser & Chalmers Eng'g Wks.
Ward (Thos. W.) Ltd.

PUMPS — GRAVEL
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Denver Equipment Co. Ltd.
Ruston Bucyrus Ltd.

PUMPS — SAND
Denver Equipment Co. Ltd.
Fraser & Chalmers Eng'g Wks.

PUMPS — SINKING
Thom (John) Ltd.

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Wood (Hugh) & Co. Ltd.

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Eimco (Great Britain) Ltd.
Joy-Sullivan Ltd.

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Hilger & Watts Ltd.

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The Pascall Eng'g Co. Ltd.

THICKENERS
Denver Equipment Co. Ltd.

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Hickson's Timber Impregnation Co. (G.B.) Ltd.

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English Electric Co. Ltd.
General Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.

TUBE MILL LINERS
Hadfields Ltd.

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Richardsons Westgarth (H'pool) Ltd.

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VEE-ROPE DRIVES
Wigglesworth (F.) & Co. Ltd.

WATER SUPPLY EQUIPMENT
Thom (John) Ltd.

WELDING
Cementation Co. Ltd.

WELDING ELECTRODES
Metropolitan-Vickers Electrical Co. Ltd.

WELDING EQUIPMENT
British Insulated Callender's Cables Ltd.
English Electric Co. Ltd.
Lincoln Electric Co. Ltd.
Metropolitan-Vickers Electrical Co. Ltd.
Siemens-Schuckert (G.B.) Ltd.

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